APRIL, 1957

Commercial Fertilizer
and PLANT FOOD INDUSTRY

BENEFITS OF CALCIUM SULPHATE IN AMMONIATED SUPERPHOSPHATE

SEE PAGE 19

Take a good look at your multiwall bag!

Like women's bathing suits, multiwall bags also reveal the passing of time.

Is your bag a vivid, modern example of your business vitality . . . or is it dull, drab and lacking in appeal?

Is your bag the ideal package for your product, in size and construction, or is it a carry-over from the past?

To compete successfully in your markets, your package should be as up-to-date as this issue of the magazine . . . *if it isn't*, it's a good idea to send for us.

KRAFT BAG CORPORATION

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Daily News Bldg., Chicago 6, Ill.
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Sales Agents for The Kraftpacker

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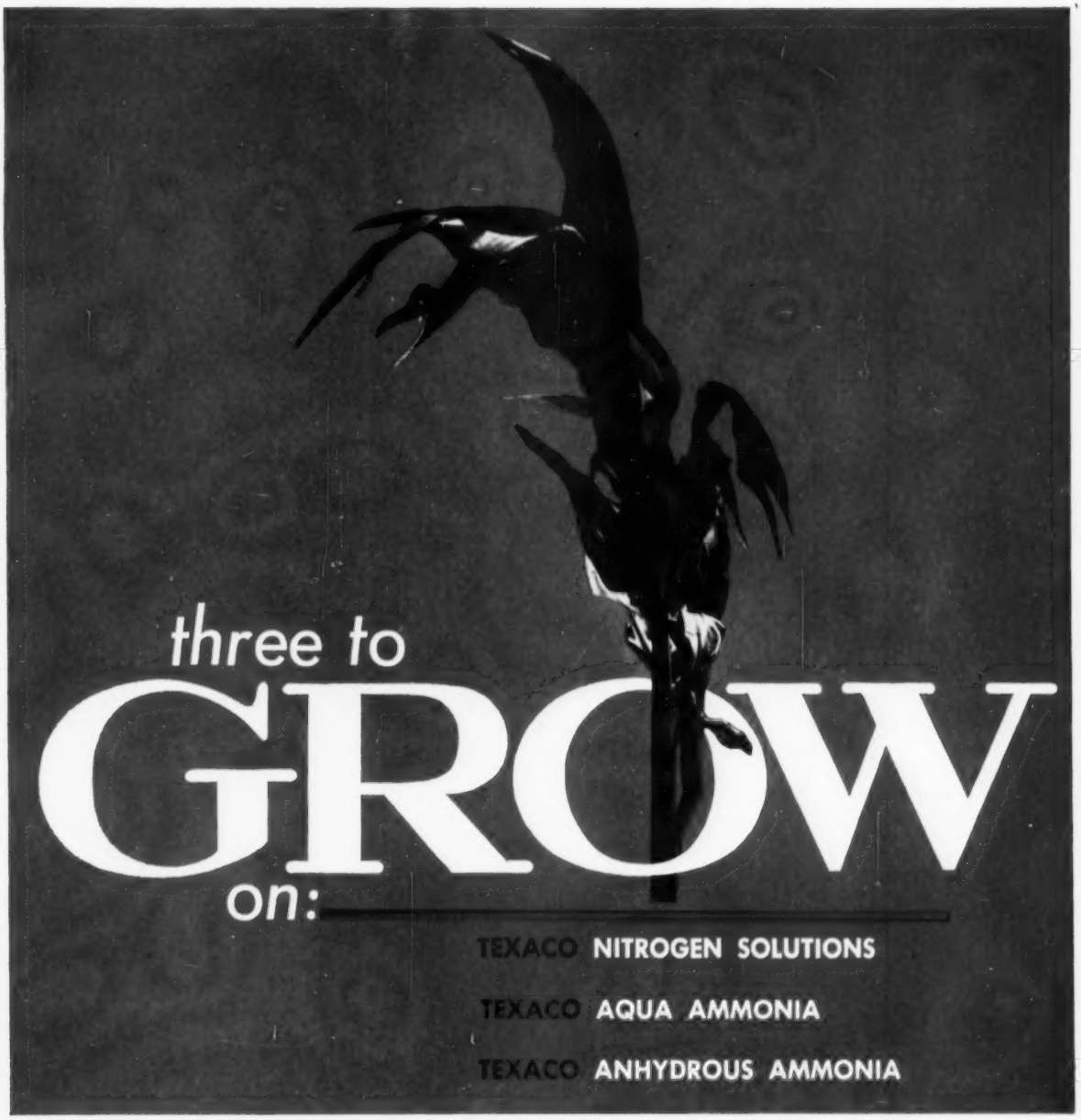

. . . fertilizer material from Texaco's new midwest plant

From Texaco's new ammonia plant at Lockport, Illinois, will soon come a line of chemical raw materials to serve the growing Midwest fertilizer market: Texaco Nitrogen Solutions, Aqua Ammonia, and Anhydrous Ammonia . . . each made to exacting specifications at one of the most modern plants of its kind in the country . . . with rapid tank truck and tank car service from the heart of the farm belt.

With the start-up of the Lockport plant, Texaco will offer fertilizer manufacturers all the advantages of uniform product quality, a dependable, centrally located source of supply, and expert technical assistance.

Look to Texaco for chemicals to *grow* on.

The Texas Company, *Petrochemical Sales Division*, 135 East 42nd Street, New York 17, N. Y., 332 South Michigan Avenue, Chicago 4, Ill.

TEXACO PETROCHEMICALS

Published Monthly by
WALTER W. BROWN PUBLISHING CO., INC.
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and PLANT FOOD INDUSTRY

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Contents

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Commenting Freely

by BRUCE MORAN

If an expert is "a person who avoids small errors as he sweeps on to the grand fallacy"* then the City Fathers of Baltimore must be experts indeed. Cities need taxes, of course, to support their ever-growing capacity for spending public money. But those taxes must come, at least in some measure, from industry. And a city which gains the reputation of being tough on industry soon finds itself with idle areas, empty plants . . . and payrolls that have gone elsewhere.

I mention Baltimore because it immediately concerns our industry. Our Year Book for 1956 lists 17 concerns in Baltimore in the fertilizer field. Already Davisons have announced that they will switch a proposed plant from Baltimore to a "city in the Southeast." Already another big Baltimore company, Esso Standard Oil, have laid off 175 workers from construction projects in Baltimore which are now cut back.

When the same thing happened in Bayonne, N. J., Tidewater Oil left . . . and Bayonne abandoned its plan for added taxes on industry. The moral should be quite clear to all of us. And we can hope cities everywhere learn the lesson before our people are forced to move elsewhere.

*Quote from American Potash Institute's "Better Crops with Plant Food" January.

When we checked International's

"How to get an extra 212 lbs. of nitrogen solution in each ton of triple"

says Mr. W. R. Edgecomb, Treasurer and General Manager of the Aroostook Hi-Test Fertilizer Company, Presque Isle, Maine

With International's triple we use 666 lbs. of nitrogen solution* per ton, reports Edgecomb. With another triple, our ammoniation rate was only 454 lbs. of solution per ton.

*24.5% free NH_3; 56.0% Ammonium Nitrate; 10.0% Urea; 9.5% H_2O.

A calibrated measuring tank is the heart of Hi-Test's batch ammoniating system. Triple is ammoniated as it is unloaded from rail cars.

Superior ammoniation qualities make International's triple ideal for high analysis fertilizers. Complete ammoniation reduces chance of setting up.

The Hi-Test plant mixes four grades of high analysis fertilizers . . . all sold under the Hi-Test brand name. 80-pound bags are moved by conveyor.

ammoniation rate, we learned

Superior ammoniation qualities are important reasons why Mr. W. R. Edgecomb (left) and Mr. Harry W. Trask, Sales Manager, are satisfied users of International's triple super.

"WE LEARNED by experience. Our ammoniation rate proved that International's triple had the superior ammoniation qualities we were looking for," says W. R. Edgecomb, of the Aroostook Hi-Test Fertilizer Company.

"We ammoniate 1500 pounds of International's triple with 500 pounds of nitrogen solution. This gives us a base of 11.1% nitrogen and 35.2% A.P.A."

Compare these results with the ammoniation rate for the triple they previously used — 370 pounds of solution for each 1630 pounds of triple. It's easy to see why International's triple helps this Presque Isle, Maine, firm hold down formulation costs . . . why they are really sold on International.

From the time they receive the triple at their plant siding . . . this highly efficient fertilizer plant operates to take full advantage of the many savings offered by International.

First of all, water shipments to Searsport, Maine, help hold down the cost of the delivered goods. The triple is then shipped by rail to Presque Isle.

Then Aroostook ammoniates the triple from the track. The triple passes through a batch ammoniating system featuring a calibrated measuring tank.

This ammoniating procedure, says Edgecomb, gives them superior results and reduces the possibility of the ammoniated triple setting up. And in addition it gives the material a more desirable granular texture.

What's more, with International's triple they are able to unload a car of nitrogen solution in 1½ days . . . a saving of a full half day. This in turn helps avoid any extra demurrage charges.

This system enables Hi-Test to handle large shipments of triple during the slack season and save on freight. With four men working, they can ammoniate 90 tons of triple (121 tons of base goods) in a normal working day.

If you have not already tried International's superior product — the triple with a guaranteed constant minimum of 46% A.P.A. — put us to the test. You too will become a satisfied customer.

Write or wire International Minerals & Chemical Corporation for full information on prices, shipping and warehousing arrangements.

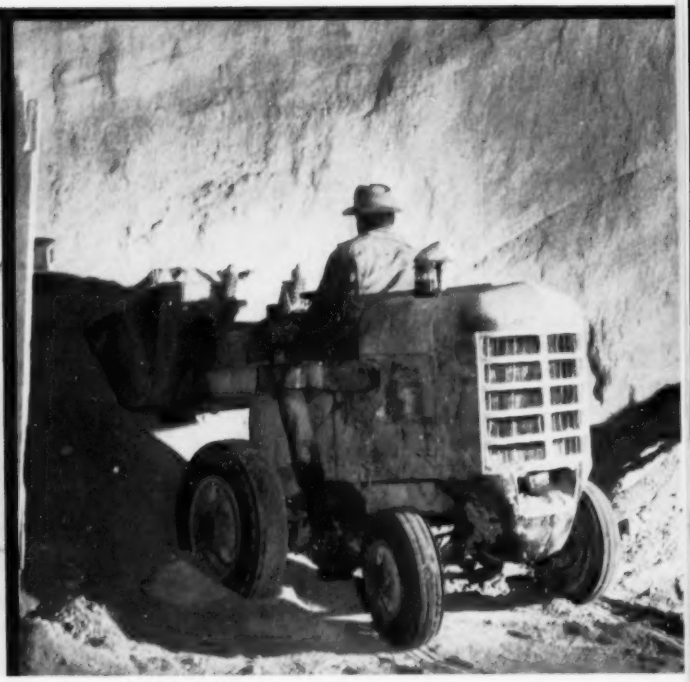
PHOSPHATE CHEMICALS DIVISION

MINERALS International CHEMICALS

INTERNATIONAL MINERALS & CHEMICAL CORPORATION

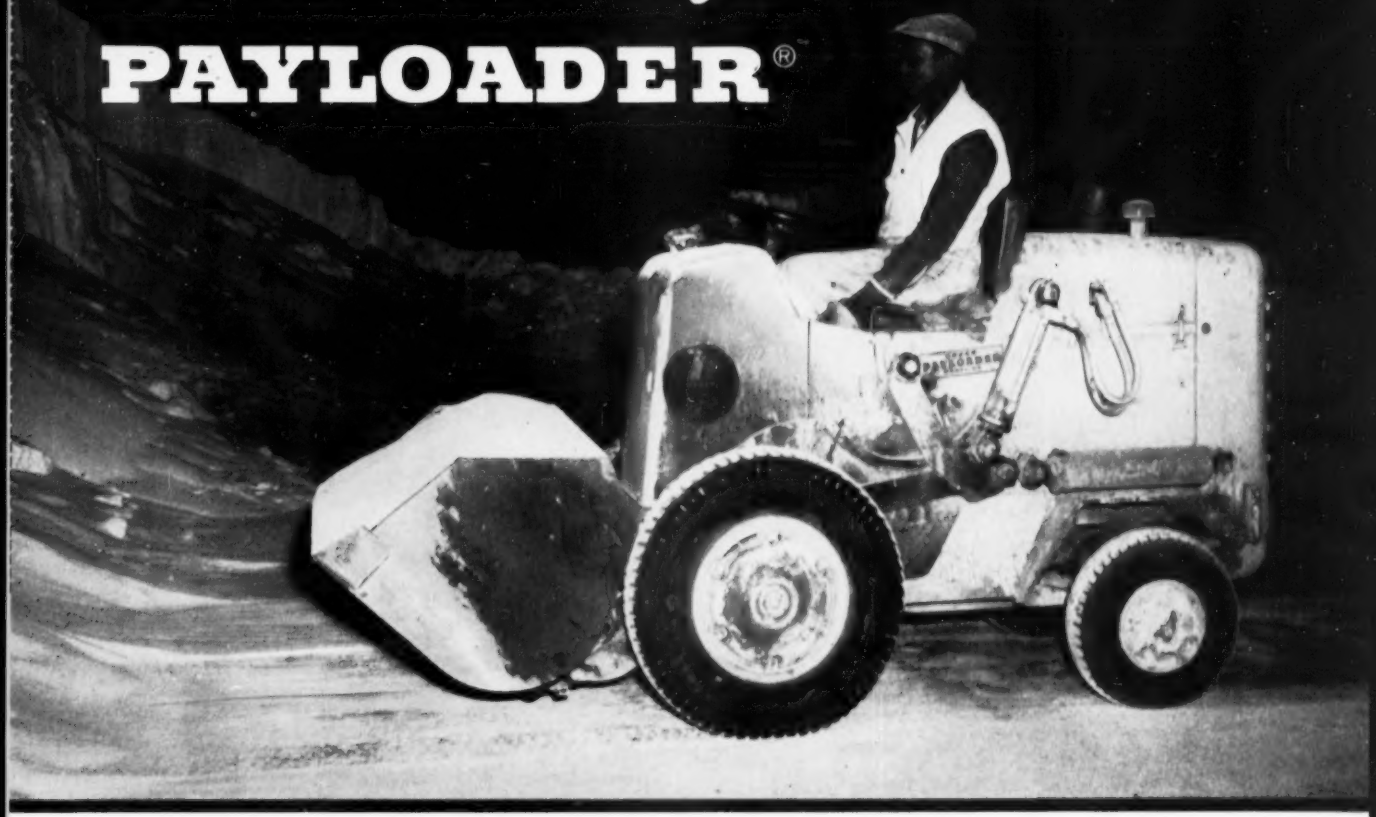
General Offices: 20 North Wacker Drive, Chicago 6

If you are still using any of these **PAYLOADER**® models...



...built between 1940 and 1956

It will pay to trade for this new style PAYLOADER®



...handle up to 100% more

Long-time users of "PAYLOADER" tractor-shovels report that the new style model HA "PAYLOADER" does up to 100% more work than the last previous model and outperforms all other comparable sizes of tractor-shovels including some bigger, heavier machines.

Many advanced design features contribute to the outstanding superiority of the new HA — the distinctive bucket motion with 40° tip-back break-out action at ground level — the hydraulic load-shock absorber that permits higher travel speeds and reduces spillage — the exclusive one-lever bucket control that simplifies and speeds operating cycles. These are only a few of the reasons why the new style model HA makes your operators more productive — why they can dig more, carry more and deliver more tonnage at lower cost.

WANT PROOF? If you are using a "PAYLOADER" that is more than 2 years old, ask your "PAYLOADER" Distributor for a demonstration of the latest model and see how much more work your operator can turn out — and how much more than with any comparable size machine. Call him today.

- Shortest turning radius
- Higher dumping height
- Biggest bucket (18 cu. ft. payload)
- Hydraulic load-shock absorber
- 40° bucket tip-back at ground level
- Exclusive one-lever bucket control

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THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
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THE FRANK G. HOUGH CO.
702 Sunnyside Ave., Libertyville, Ill.

Send full data on "PAYLOADER" tractor-shovels as follows:

☐ Front-wheel-drive models HA (18 cu. ft.) and HAH (1 cu. yd.)

☐ Larger models including 4-wheel-drives up to 2½ cu. yd.

Name _____

Title _____

Company _____

Street _____

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JUST AROUND THE CORNER *by Vernon Mount*

CONTRADICTIONS abound in the US these days. As we predicted some time back, screams have arisen for economy, and there is much shouting on the subject by Congress. But at the same time the Congress has approved a program which puts us in the position of undertaking the defense of practically all of the non-Communist world.

IN THE DUST we have drawn a line. Should Russia step over it, we're at war. And it takes a lot of materiel, which keeps getting out of date, to keep our dominant military position.

THAT MEANS our military budget must stay high, which means in turn that it will be very hard to get the overall Government budget down, because the military, as our readers well know, soak up most of the budget. Perhaps there are economies, but they are going to be hard to find on a scale that will make any real difference.

Yours faithfully

Vernon Mount

Carteret A.A.C. Co. Plant
at Carteret, New Jersey

Another source of AA quality products

To meet your "quick" or "long term" requirements for a variety of chemicals, depend on the A.A.C. Co. You can count on uniform quality and guaranteed purity through rigid laboratory control. You'll get expert assistance from skilled research people in developing "specials" for unusual projects. And you can count on prompt service.

CHOOSE FROM THESE AA QUALITY® PRODUCTS FOR FARM AND INDUSTRY

Florida Phosphate Rock • Superphosphate • AA QUALITY Ground Phosphate Rock
All grades of Complete Fertilizers • Gelatin
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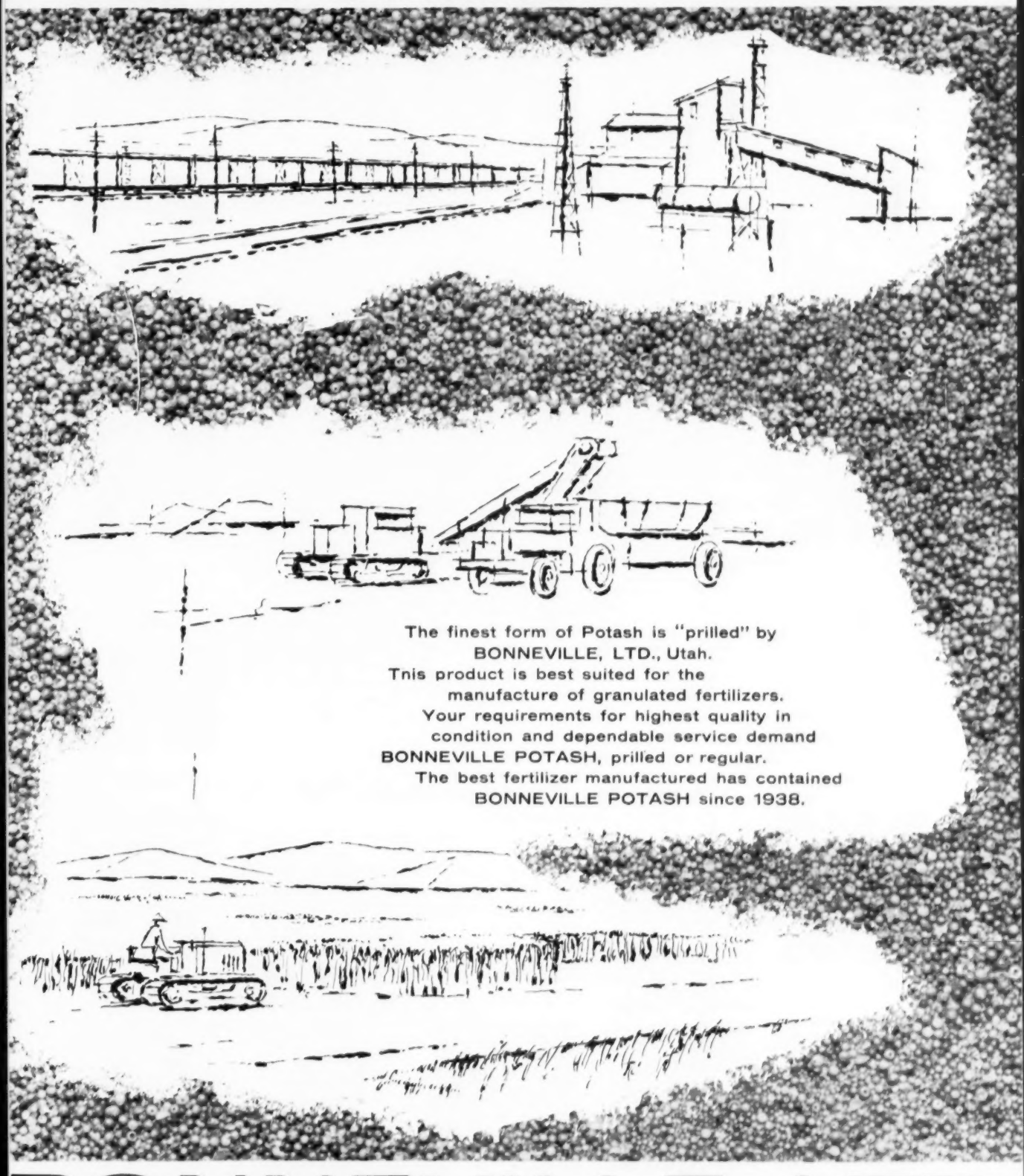
FIRST PRILLED POTASH



The finest form of Potash is "prilled" by
BONNEVILLE, LTD., Utah.
Tnis product is best suited for the
manufacture of granulated fertilizers.
Your requirements for highest quality in
condition and dependable service demand
BONNEVILLE POTASH, prilled or regular.
The best fertilizer manufactured has contained
BONNEVILLE POTASH since 1938.

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The door to service

...swings wide at SOHIO

When you need fast, dependable service and accurate technical information from your nitrogen supplier, you can be sure you'll be pleased with the service from Sohio.

Ammoniation a problem? Sohio's technical service staff is always ready to help. They'll be able to offer you unbeatable flexibility in ammoniation — with Sohio's full product line.

If costs are your concern, Sohio's cost analysis service can help ferret out the cause of many a profit-robbing problem.

Since dependable delivery is always important, Sohio is prepared to extend you every service — fast delivery from huge storage and loading facilities, speedy truck service, and five rail lines out of Lima.

So if you need nitrogen, call Sohio . . . and get service.

SOHIOGEN® SOLUTIONS

A complete line of products for fertilizer manufacture

Ammonium Nitrate — Ammonia Solutions

Sohiogen 1, Sohiogen 2, Sohiogen 3, Sohiogen 4 — The standard solutions familiar to the fertilizer industry

Urea — Ammonium Nitrate-Ammonia Solutions

Sohiogen 10, Sohiogen 11, Sohiogen 12, Sohiogen 15 — 41 to 44% nitrogen solutions containing 10 to 15% urea to help mixed goods conditioning

Urea — Ammonia Solutions

Sohiogen 21, Sohiogen 22 — Urea and ammonia in 45% nitrogen solutions, winter and summer grades

Urea — Ammonium Nitrate Solutions

Sohiogen 31, Sohiogen 32 — 28 and 32% nitrogen solution used to add supplemental nitrogen to mixed fertilizers

Urea — Water Solution

Sohiogen 40 — 40% urea solution, liquid source of supplemental nitrogen

Sohio Anyhdrous Ammonia

Sohio Aqua Ammonia

Sohigro Urea

A 46% nitrogen, prilled urea fertilizer material, bagged or bulk supplemental source of nitrogen

NEW CONCENTRATED SOLUTIONS

Sohio Chemical Company offers a complete line of concentrated type solutions — tailored to fit your particular needs. We invite your inquiries for technical assistance on how these new solutions can offer attractive economies in your operations. You'll save freight and labor. Reduced moisture content lowers drying costs; improves storage quality.

We're serious about service at Sohio

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SOHIO®

NPFI Sponsors Western Projects

Dr. Russell Coleman, executive vice president of the National Plant Food Institute, has announced Institute-sponsored projects with educational institutions for three Western states "designed to focus attention on the importance of using fertilizer more efficiently."

The projects are:

Washington — Production of a leaflet by the Institute in cooperation with Washington State College, entitled "Soil Testing is Good Business." Copies of this leaflet are being made available gratis to the college for distribution by the State Extension Service through dealers and county agents.

Oregon — Production of a large, color poster (17 x 22") by the Institute with the advice and assistance of Oregon State College, focusing attention on soil testing and the proper use of fertilizer. Distribution will be made by the college. The poster is designed to be displayed in the offices of fertilizer dealers, county agents, Federal agricultural workers, and others.

California — The Institute has completed arrangements with the Bureau of Agricultural Education, California State Department of Education, for a $1,500 fellowship at the California State Polytechnic College. The recipient of the fellowship will devote his efforts to developing subject matter materials and teaching plans dealing with fertilizers and fertilizer use. The findings later will be printed and distributed to teachers of vocational-agriculture in the state.

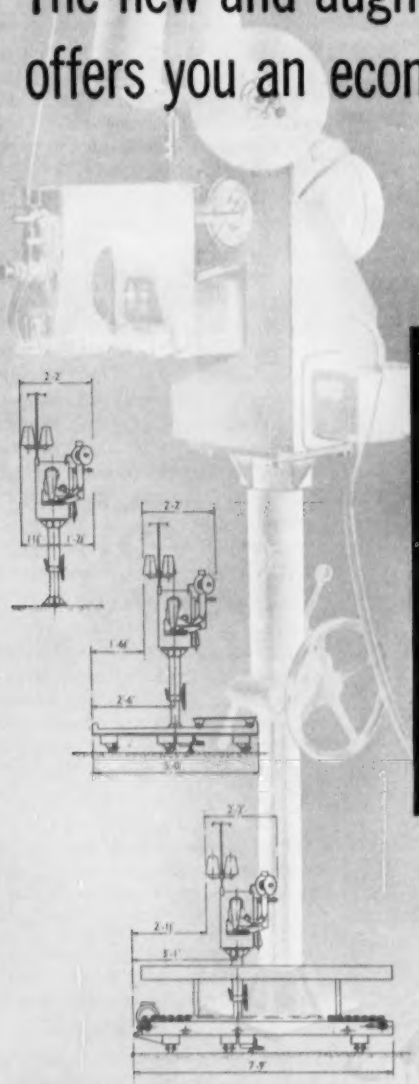
Maryland Soil Leaflets Popular

Widespread interest by Maryland farmers and bankers in soil fertility and soil testing has resulted in a record disposition of 18,500 leaflets, prepared by the University of Maryland, the Maryland Bankers Association, and the National Plant Food Institute, and captioned "The Maryland Bankers Association Advocates Soil Fertility."

Another project conducted by the Maryland Bankers Association in cooperation with the University of Maryland and the Institute features the distribution of advertising mats, which focus attention on the importance of soil fertility. The mats are used by country banks in local newspapers.

NOW AND NEW!

If you bag any product—
The new and augmented **BAGPAK® CLOSER** line offers you an economy machine for any need.



These new machines are geared for fast production, to meet your cost-reducing requirements. You pay lower prices for new machines that close bags faster and better—a double saving that means better profits.

THE NEW BAGPAK® CLOSERS ARE—

- ▶ ADAPTABLE TO ANY PRODUCT— ANY PURPOSE—ANYTIME
- ▶ HIGH OR LOW SPEED— UP TO 15 BAGS A MINUTE
- ▶ USED FOR ALL TYPES OF BAGS— IN WIDE SIZE RANGE
- ▶ USED WITH OR WITHOUT CONVEYORS
- ▶ SIMPLE TO OPERATE—FULLY OR SEMI-AUTOMATIC
- ▶ APPLIES FAMOUS BAGPAK CUSHION STITCH —OR SEWS THROUGH COTTON OR PAPER FILLER CORD

Ask for Bagpak's experienced Planning and Service Engineers to explain the cost—and time-saving features of the new, low cost CLOSER line. Get lower cost, faster production—better looking packages—more efficient labor. Call for Bagpak Planning Service, or write—CF-4

See our complete line of BAGPAK® CLOSERS at the American Feed Manufacturers Association Feed Show, Booths 195-196, Conrad Hilton Hotel, Chicago, May 1-2-3.

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Fifth Annual CFA Conference

The Fifth Annual California Fertilizer Conference will be held on the campus of Fresno State College, Fresno, Monday, April 15, 1957. This Conference, of vital importance to all persons interested in soil fertility and plant nutrition, will be sponsored by the Soil Improvement Committee of the California Fertilizer Association. An outstanding program is being completed which will feature not only qualified technicians of the agricultural colleges of California, and of the fertilizer industry of the State, but outstanding authorities from other areas as well. The banquet will be held at the Fresno Hacienda on the evening of April 15, featuring Dr. Firman E. Bear, Rutgers University, New Brunswick, New Jersey.

CFA suggests that you arrange for your over-night accommodations in Fresno or vicinity. Fresno is hosting another large convention at this same time, headquartered at a downtown hotel. The Convention Bureau advises that **all** downtown hotels, and the following motels in North Fresno will have no rooms available for our group: Bel Aire, El Rancho, Fresno, Park and Town House.

Bill Could Free Trucked Fertilizers

Rep. E. C. Gathings (D-Ark.), Chairman of the House Committee on Agriculture's Subcommittee on Equipment, Supplies and Manpower, has (Mar. 7) introduced a Bill (H. R. 5765) to amend the Interstate Commerce Act, to provide an exemption from economic regulation by the Interstate Commerce Commission in the case of fertilizer and fertilizer materials when being transported by truck.

The Bill was referred to the House Committee on Interstate and Foreign Commerce, but hearings have not been scheduled.

"The successful passage of the Bill would be helpful to farmers," Paul T. Truitt, Executive Vice President of the National Plant Food Institute, said. "If approved, the delivery of fertilizers would be facilitated during the spring season when demand is at a peak."

2-Day School

NPFI is sponsoring a 2-day school for chemical analysts May 3-4 at Purdue University.

Arcadian® News

Volume 2 | For Manufacturers of Mixed Fertilizers | Number 4

Benefits of Calcium Sulphate in Ammoniated Superphosphate

FERTILIZERS CONTAINING GYPSUM HAVE EXTRA VALUES

You miss a good sales point if you don't tell dealers and farmers about the extra plant foods you give away in mixed fertilizers made with superphosphate. For every unit of phosphorus in superphosphate, you give the farmer about 137 pounds of gypsum (calcium sulphate). Both the calcium and the sulphur in gypsum are valuable plant foods. In addition, gypsum is an excellent soil conditioner.

By law, a complete fertilizer contains available nitrogen, phosphorus and potash. But most crops also need large amounts of three other plant foods: sulphur, calcium and magnesium. For many crops, sulphur is as important as phosphorus. Since sulphur leaches out of the soil readily, while phosphorus does not, sulphur must be added frequently. Fertilizers containing superphosphate are an excellent source of both. The highly concentrated, mixed fertilizers made with other sources of phosphorus lack the sulphur needed by crops.

Sulphur Leaches Fast

Legumes and some other crops use more sulphur than phosphorus. Small grains contain much phosphorus, while grain straw contains much sulphur. Both timothy and alfalfa hay contain more sulphur than phosphorus. Virgin soils are no better supplied with sulphur than with phosphorus. Experiment Station lysimeter tests show that the phosphorus loss in drainage water is too small to measure, but sulphur is lost at the rate of 30 to 60 pounds per acre.

Rainwater returns some sulphur to the soil, in areas where much coal is burned. But elsewhere, many soils are fast running out of sulphur. This makes your mixed fertilizers made with superphosphate an especially good buy. For the sulphur and the calcium contained in the superphosphate, farmers pay nothing but freight and handling costs.

Cotton is a heavy user of sulphur. So are corn, legumes, onions and cabbage. Some crops need more sulphur than phosphorus. Many soils are running out of sulphur fast. Gypsum in superphosphate helps put it back.

Strong Selling Points

This makes superphosphate the best phosphorus carrier to use on sulphur-deficient soils. On non-acid soils in general, the U.S.D.A. rates phosphate sources in this order: ordinary superphosphate, double superphosphate, ammonium phosphate, liquid phosphoric acid, calcium metaphosphate, di-calcium phosphate, tri-calcium fused phosphate, colloidal and rock phosphate. Yes indeed, your mixed fertilizers made with normal superphosphate have some strong selling points!

The gypsum in superphosphate is also an excellent soil conditioner. In fact, farmers use more than 740,000 tons of gypsum a year in addition to the gypsum they get in superphosphate. In a year's time, the gypsum in superphosphate used by farmers amounts to 4¾ million tons—all for the cost of shipping!

When you ammoniate superphosphate for your mixed fertilizers, you are giving farmers a bargain in free sulphur, calcium and soil conditioner. You and your dealer will benefit by telling farmers about these bonus values.

Enduring Nitrogen Expands Non-Farm Fertilizer Market

Farm use of fertilizer has hit a temporary plateau but non-farm markets are growing fast. Twenty-two million non-farm home gardeners use more fertilizer per acre than farmers and pay a higher price. Highways, golf courses, playgrounds, cemeteries and nurseries are also big users of fertilizers.

These consumers prefer one-application, labor-saving fertilizers. That's why the new mixtures containing enduring nitrogen are proving very attractive. It will pay you to take advantage of this new interest in fertilizers to increase your sales and your profits.

Get All the Facts

Start now to investigate the use of urea-form nitrogen in mixed goods. You'll discover that there are several ways to use urea-form nitrogen to make long-lasting, high-nitrogen fertilizers that can be spread in one heavy application without danger of burning.

The best method is to use N-dure* urea-formaldehyde Solution, plus some solid Urea 45, in making mixed goods by your regular ammoniation procedure. This combination gives you everything your customer wants, in well-conditioned fertilizer, at low cost to you.

More Profit for You

By using N-dure Solution and Urea 45, plus other nitrogen sources, you can make a variety of ratios of enduring and quick-acting nitrogen. Using your present equipment, you can produce analyses of the major plant foods to fit every specialty market.

By proper formulation, you get dust-free, chemically-blended, semi-granular, top-condition, complete fertilizer with long-lasting, non-burning nitrogen, at a cost that gives you more profit.

For full information on the use of N-dure Solution, contact Nitrogen Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, N. Y.

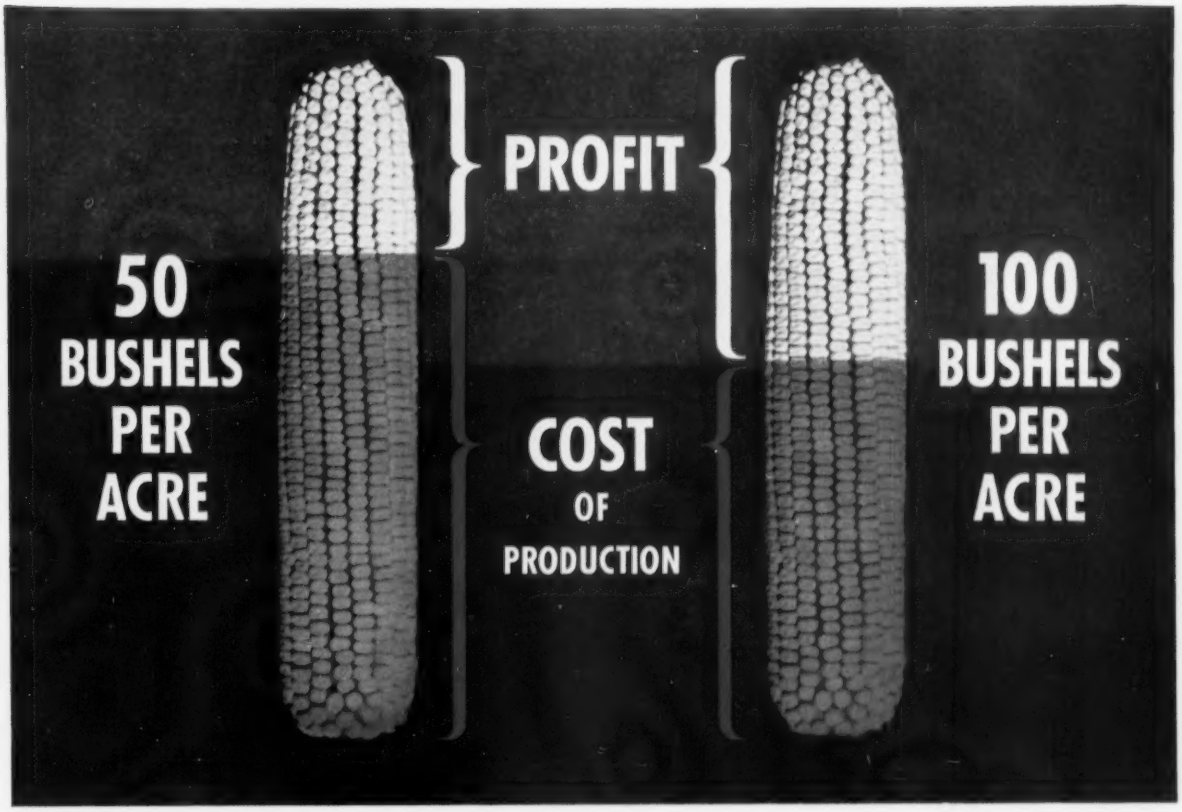
*Trade-mark

ANOTHER NITROGEN DIVISION AD to help you SELL FERTILIZER

Fertilizer Grows Farm Profits is the theme of the big, powerful advertising campaign now being conducted by Nitrogen Division, Allied Chemical & Dye Corporation, to help you and other fertilizer manufacturers sell a bigger tonnage of complete fertilizers to farmers.

The advertisement on the opposite page is the tenth in a series of full-page advertisements which have appeared in farm magazines reaching and influencing millions of farmers. This campaign is designed to tell the farmer that fertilizer is a profitable investment and the best help he can get under present conditions.

We trust you are pleased with this effort on the part of Nitrogen Division in behalf of the entire fertilizer industry. We will greatly appreciate any comments and suggestions you may wish to send to Nitrogen Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, New York.



How much of your corn is profit?

Part of every bushel of corn you grow is cost of production and the rest is profit. When you greatly increase your per-acre yield with fertilizer, you reduce your cost of production per bushel and increase your profit.

Fertilizer is low in cost. The extra yield added by fertilizer is the most economical and most profitable share of your crop.

The ears illustrated above show how fertilizer increased profits for typical corn growers on good land. Fixed expenses, such as land-use, management, labor and machinery were the same whether the yield was 50 bushels or 100 bushels per acre.

To increase the yield to 100 bushels, the only extra investment required was MORE FERTILIZER per acre, more seed for closer spacing and extra labor for harvesting the larger yield. Fertilizer added 50 extra bushels per acre at very low extra cost and far greater profit per bushel.

More fertilizer per acre is your best-paying investment. Results vary on different crops and soils but the basic economic fact prevails—a bushel or a pound of any crop can be produced much more economically when the yield is high than when the yield is low. More fertilizer is the direct route to high yields.

The price of fertilizer has not gone up like the price of most things you buy. It will pay you to use more fertilizer per acre! Right now is a good time to talk it over with your county agent and your fertilizer dealer!

The fertilizer industry *serves the farmer. Nitrogen Division serves the fertilizer industry as America's leading supplier of nitrogen, the growth element in mixed fertilizers. Nitrogen Division, Allied Chemical & Dye Corporation, New York 6, N. Y.*

NITROGEN DIVISION ALLIED CHEMICAL

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3M	44.0	28.0	60.0	—	12.0	1.083	25	-36
3MC	47.0	29.7	64.5	—	5.8	1.089	34	-30
4	37.0	16.6	66.8	—	16.6	1.188	1	56
4M	41.0	19.0	72.5	—	8.5	1.194	7	61
6	49.0	34.0	60.0	—	6.0	1.052	48	-52
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12	44.4	26.0	50.0	12.0	12.0	1.081	25	- 7
13	49.0	33.0	45.1	13.0	8.9	1.033	51	-17
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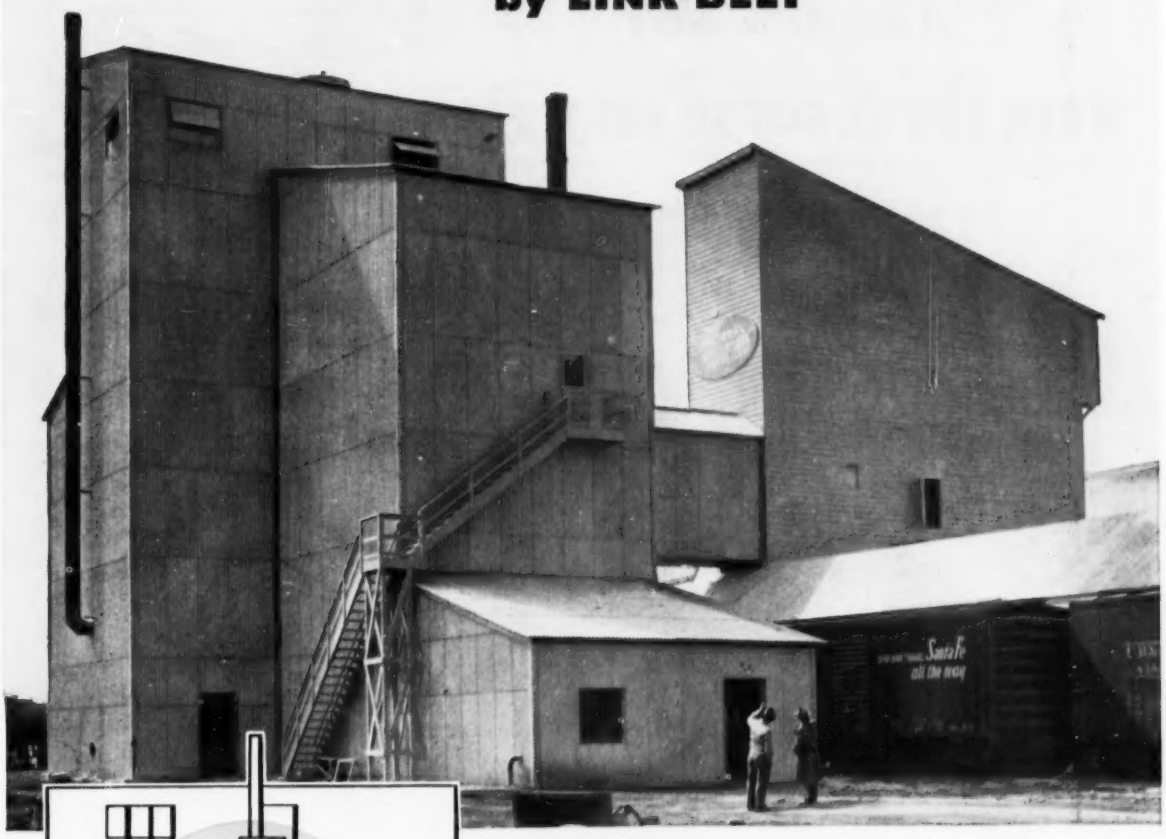

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HOW TO DESUBSIDIZE THE FARMER

by Tom Anderson,
Editor & Publisher, Farm And Ranch
in the March issue

Who is a farmer? Before we decide exactly what government should do for farmers we need to decide who is a farmer. Twenty-two million Americans live on farms. Several million more are city farmers of various kinds: Absentee landlords, tax deduction farmers, hobby farmers, nature lovers, and producers of back-yard parity patches. Who is a farmer? Are the 30 per cent of people living on part-time or residential farms "farmers," even though their main source of income is not farming? Are town people who have cotton or tobacco allotments in their backyards farmers? Should the farm program be for anybody who calls himself a farmer? For anybody who grows a price-supported crop?

There are about 4,800,000 American farms (8,300,000 fewer farmers than in 1940). About 2,200,000 of these farms are commercial farms, mostly family operations. These farms account for around 88 percent of our total agricultural production. You've heard that farmers now comprise only 13 percent of the U. S. population. Actually, the total is not nearly that high. Because that 13 percent includes 878,136 residential farms whose occupants like to "live in the country" but who don't really farm for a living. They sell less than $250 of farm products a year. They get most of their income from other work. Price supports don't affect them much because they have little to sell. So there are really less than three million honest-to-goodness full-time, producing farmers. That's about eight percent of the population. And that eight percent produces most of the food and fiber sold in this country and abroad.

About ten percent of the "farms" are under ten acres and about six percent are over 500 acres. Should the farm program include them too? The one is not really a farm and the other ought not to need permanent government help.

How do we get back to a free, decontrolled, supply-and-demand agriculture without hurting too many people? It can't be done suddenly. But we should make a beginning, now. Some ideas were expressed in Farm and Ranch in December '55, January '56 and February '56 aimed in that direction. The suggestions received wide and enthusiastic support from subscribers. But there were several quite radical features which scared some people. And politics being what it is, I'll freely admit that some of the ideas were scarcely feasible politically.

In brief, I suggested de-subsidizing top and bottom fringes: corporate farms, tax-deduction, hobby, and play-farmers, and inefficient, subsistence farmers by:

1. Making ineligible for any Federal Government subsidies or services every farmer whose non-farm income (based on three years' income tax reports) exceeded, say $5,000.

2. Making farm losses non-deductible from non-farm income, so every farming operation would have to stand on its own legs taxwise.

3. A stepped-up subsidy program for the lower-fringe subsistence farmer to subsidize him, not to stay in farming when he hasn't a chance to live decently, but to get a good job in town.

I felt then and feel now that the farm program and all Federal Government services should be restricted to the "family farm," the farm in which the farm family has management control of the operation, whose main business is farming, who is dependent on it for their livelihood, and who actually engage in farm work.

If we could make ineligible for any part of the farm program the clerk who has a .6 acre tobacco allotment in his backyard, the tycoon whose lands are a tax-and-inflation dodge, city garden clubs, and hobbyists, it'd be far easier to return to a free, supply-and-demand agriculture. (And to balance the budget). If the subsistence farmers got a job in town they'd live better and would be an asset to the nation instead of a drain on the taxpayer. Of course, such a procedure would be "class legislation" (which we already have too much of) and might be dangerous to do on even a temporary basis though the ultimate aim would be a free, classless agriculture.

It is a sad and brutal fact that more farmers are going to have to quit farming. What better time to quit than in the period of our greatest prosperity? Once we have a depression or even a good recession, new jobs in town will get scarce.

And a good way to have a depression is for the government to keep spending astronomical sums to pay people to stay in farming when everybody concerned would be better off if they moved to other fields. We must find a way to quit supporting unneeded production. Everyone who wants to stay on a farm has every right in a free country to stay. But it's silly to pay him permanently to stay permanently.

What to do for the small "inefficient" farmer? Those who have neither the land, know-how or desire **ought** to move into industry. Or to put it another way, if they insist on staying on the farm they should not stay on a permanent dole. Mightn't it make more sense to subsidize inefficient farmers and those on unproductive land to leave the farm so the ones who're left could make a better living in a free market? It would be better for everybody concerned for the government to pay the cost of moving a family off the farm than to pay it to stay there. If the ones who haven't got a chance to make a decent income are helped to get jobs in industry and quit farming, the better farmers who need only more land to succeed can be helped to get the necessary credit to acquire adequate land and equipment.

There will continue to be less and less room for bottom-fringe farmers, farmers with poor land, farmers with little know-how and little desire.

But there is a future in farming —particularly in the New South— for farm families who have the land, equipment, and the know-how; who **want** to farm and live better; and who are in farming as a **business** not merely a way of life.

INTERIM REPORT

TVA *Liquid Fertilizer Experiments*

WITH WET-PROCESS ACIDS

The primary drawbacks of liquid fertilizers from an economic viewpoint are the high cost of raw materials, particularly electric furnace phosphoric acid, and the low analysis of the products.

TVA has been carrying out studies which are directed toward overcoming these two drawbacks. One phase of the work involves the use of wet-process phosphoric acid instead of electric furnace acid to produce liquid fertilizers of the same grades as now are produced in industry. The other phase involves the production of liquid fertilizers of unusually high concentrations through the use of phosphoric acid containing 75 to 77 per cent P_2O_5 (equivalent to 104 to 106% H_3PO_4). The present report gives a brief account of the results obtained thus far.

The most prevalent practice in the manufacture of liquid fertilizers is to neutralize conventional electric furnace acid with ammonia. Wet-process acid, which often is cheaper than furnace acid, seldom is used because it contains impurities that precipitate on neutralization.

However, TVA has found that by rapid continuous ammoniation of wet-process acid the impurities in the resultant suspension are in a finely divided state and settle very slowly on standing.

In the TVA tests, ammoniation was carried out in a vertical section of 1-inch pipe; the pipe was water-jacketed for cooling. Wet-process phosphoric acid and gaseous ammonia were fed continuously through a tee at the bottom of the 1-inch pipe. The ammoniated mixture overflowed through an outlet 4 feet above the tee. The acid was fed at a rate of about 26 pounds of P_2O_5 per hour. The ammonia flow was adjusted to give a pH of about 7. The retention time during ammoniation was about 1 minute.

The ammoniated mixtures were collected in a vessel and diluted with water to give an 8-24-0 grade. Tests were made using acid diluted to 25, 30, and 40 per cent P_2O_5. Best results were obtained with acid diluted to 30 per cent P_2O_5. The product made from the stronger acid gelled, and solids settled rapidly in the product made from the weaker acid. Increasing the retention time during ammoniation also resulted in increasing the settling rate of solids in the product.

Wet-process phosphoric acid purchased from two companies has been used. Liquid fertilizer made from one of these acids showed essentially no settling even after storage for several months. A small amount of settling occurred in the liquid fertilizer made from the other acid; however, the sedimentation could be dispersed easily with light agitation. No crystallization occurred on storage at 32° F. for 3 months.

The suspension-type fertilizer was handled in mild steel and was pumped satisfactorily with ordinary equipment. About 3 tons of 8-24-0 fertilizer made in the laboratory from ammonia and wet-process acid were applied in two tests on a Kentucky farm. In these tests, which were carried out in cooperation with the Kentucky Agricultural Extension Service, the fertilizer was applied at rates of 50 or 75 pounds of P_2O_5 per acre using a pesticide pump and a pipe fitted with spray nozzles.

In one test the spray equipment and fertilizer feed tank were mounted on a trailer drawn by the tractor. In the other test the equipment was mounted on the tractor. Both arrangements were satisfactory. No stoppages of the pump on nozzles resulted from the presence of the suspended solids, and the fertilizer was applied at a uniform rate. No appreciable amount of sediment remained in the drum at the end of the tests.

Liquid fertilizers of grades including 12-36-0, 10-10-10, 10-20-10,

Pilot plant for production of high-analysis liquid fertilizers at TVA research center, Muscle Shoals, Ala.

8-24-8, and 5-15-10 that did not salt out when stored for a week at 32° F. were produced in a small pilot plant by ammoniating phosphoric acid containing 75 to 77 per cent P_2O_5 (equivalent to 104 to 106% H_3PO_4). Phosphoric acid of this concentration has a composition between orthophosphoric and pyrophosphoric acids. It has the unusual quality of being liquid even when cooled to low temperatures, whereas acid of most concentrations above the conventional 54 per cent P_2O_5 acid is solid at ordinary temperatures.

The 75 to 77 per cent P_2O_5 acid is somewhat viscous but can be handled and pumped without difficulty if suitable precautions are observed. This acid has been produced experimentally in TVA's plant for producing conventional 54 per cent P_2O_5 acid with only minor changes. The high concentration of the acid should result in appreciable savings in transportation cost per unit of P_2O_5.

To produce the 12-36-0 solution, phosphoric acid containing 77 per cent P_2O_5 was neutralized with ammonia. The acid, anhydrous ammonia, and water were fed into a vessel in which they were mixed together thoroughly. The solution was cooled during ammoniation to prevent hydrolysis of pyrophosphates by circulating water through coils in the vessel.

The 12-36-0 solution, which contained 48 per cent plant food, had about half of its P_2O_5 in the form of ammonium orthophosphates and the other half in the form of ammonium pyrophosphates. It was stored at temperatures as low as 32° F. without salting out. In comparison, when 54 per cent P_2O_5 acid is neutralized, the most concentrated solution that can be produced without salting out at 32° F. contains a total of only 32 per cent plant food (8-24-0 grade).

The N-P_2O_5-K_2O fertilizer solutions were made by mixing the 12-36-0 solution with muriate of potash and urea or ammonium nitrate as required to produce the desired grade. The grades produced, 10-10-10, 10-20-10, 8-24-8, and 5-15-10, were higher than those obtained in industry from ammoniated conventional acid, that is, 9-9-9, 8-16-8, 6-18-6, and 4-12-8.

In limited greenhouse tests the 12-36-0 fertilizer solution was as effective as conventional fertilizer materials. TVA, in cooperation with experiment stations of Land Grant Colleges, plans to make extensive field tests of these concentrated liquid fertilizers.

Fertilizer manufacturers are invited to write TVA or visit the laboratories at Muscle Shoals, Alabama, to obtain details on the use of wet-process phosphoric acid in the production of liquid fertilizers and on the manufacture of phosphoric acid containing 75 to 77 per cent P_2O_5 and its use in the production of fertilizers. TVA plans to offer limited quantities of the concentrated phosphoric acid for sale to fertilizer manufacturers for experimental use in production of high-analysis liquid or solid fertilizers.

Greenhouse Tests on *Granular* Fertilizers

R. A. Struchtemeyer
Head, Department of Agronomy in Maine "Farm Research"

As soon as granular fertilizers appeared on the market, farmers and salesmen started to draw comparisons between the two materials. As usual there are two sides to the comparisons that have been advanced. The advocates of granular fertilizers emphasized the lack of dust and possibility of more even distribution when their material was being used. The advocates of pulverized fertilizer pointed out the size of the granules, the possibility of unevenness in concentration within the granules, and also the possibility of slow availability of the nutrients in the granular material particularly during dry seasons.

The availability of the granular form of fertilizer compared to the availability of the pulverized material during dry seasons has been the basis of a recent research study at the University of Maine. A sandy loam soil was taken into the greenhouse, and the amount of water at field capacity was determined as well as the amount at the wilting coefficient. The difference between these two determinations is the amount of water in the soil and available for plant growth.

After determining the amount of water the soil could hold it was decided to maintain the moisture content of the soil samples, each in its own 2-gallon pot, at one of three levels: 50 per cent field capacity, 30 per cent field capacity and 15 per cent field capacity. These moisture levels were maintained by weighing the pots daily.

Three grades of granular fertilizer were obtained: 8-16-16, 5-10-10 and 10-10-10. A portion of each sample of granular fertilizer was pulverized until 100 per cent of the material passed a 20-mesh sieve. This meant that actually six materials were to be studied, the three grades of fertilizer and each grade in both granular and pulverized forms. Each of the fertilizer materials was added to the soil in a 2-gallon pot at a rate equivalent to 70 pounds of nitrogen per acre. Each treatment was replicated three times.

Millet was planted in the pots and four harvests were made. The green millet was dried in the drying room and the yields were reported in terms of dry matter produced per pot. The results of the harvests given in the table show that there were no significant differences in yield except at the 50 per cent moisture level for the 5-10-10 fertilizer. In all other cases, comparisons made between the pulverized and the granular material of a given fertilizer grade showed that the yields were not significantly different within a given moisture level.

YIELD OF MILLET IN TERMS OF DRY MATTER PRODUCED

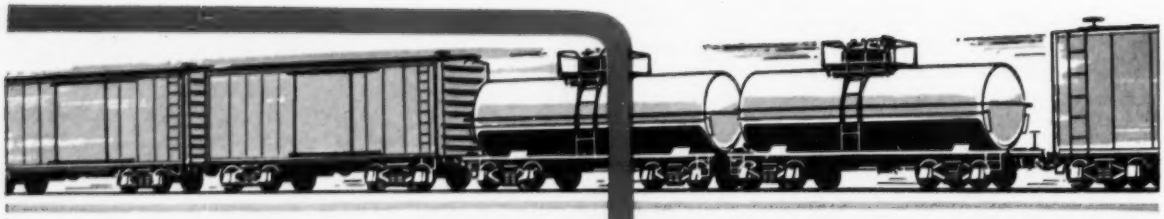
Fertilizer used	Dry Weight Yields—Grams per Pot		
	15% FC[1]	30% FC	50% FC
8-16-16 (P)[2]	7.2	17.7	25.9
8-16-16 (G)	8.7	16.9	28.8
5-10-10 (P)	8.9	17.8	23.1
5-10-10 (G)	8.4	17.7	28.6
10-10-10 (P)	9.2	14.7	23.0
10-10-10 (G)	8.8	13.2	22.8
L.S.D. at 5% level	4.02		

[1] FC—Field capacity of the soil for water

[2] (P)—Pulverized fertilizer
(G)—Granular fertilizer

Obviously the 15 per cent field capacity soil moisture level was too low to produce an optimum growth of millet. The yield of dry matter as presented in the table was considerably less at this lower moisture level than at either of the other two levels.

When lack of sufficient moisture limited plant growth the plant nutrients in the granular fertilizer were just as available as those in the pulverized material. If these greenhouse data are indicative of what happens in the field, farmers should have no cause to worry about reduced yield from granular fertilizer during drought years.



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FACTORS TO CONSIDER IN COMPARING NITROGEN FERTILIZERS

by RALPH L. WEHUNT *and* P. J. BERGEAUX
Soils and Fertilizer Specialists
Agricultural Extension Service
University of Georgia College of Agriculture

Many long-term studies have been conducted on the major nitrogen sources used by farmers. Results obtained from these experiments show that, pound-for-pound of actual nitrogen, one material is as effective as another for the production of most crops, provided lime and potash are not limiting factors. Therefore, selection of a source should generally be based on cost-per-pound of nitrogen and the cost and availability of equipment for application. There are, however, certain management practices that influence the crop response obtained from different nitrogen fertilizers.

Nitrogen is a major item in the farm fertilizer budget. Therefore, every effort should be made to assist farmers to better understand nitrogen and to encourage them to apply it in the most economical manner. The cost-per-pound of nitrogen varies considerably between sources. Assume that a pound in one material costs 19 cents and in another 12 cents. A farmer applying 80 pounds per acre to 35 acres of crop land could save approximately $196.00 by purchasing the cheaper source—or about $5.60 per acre.

Many farmers are confused about nitrogen fertilizers. Not too many years ago they had only a few sources to consider. Now there are many products from which they can select. Each year, therefore, more and more farmers are making comparisons of different nitrogen materials to determine which one is best suited for them. Although farm demonstrations are not as carefully controlled as Experiment Station field studies, they usually add, when properly conducted, further proof to truths previously established by research. Any farmer who has doubts about nitrogen research findings should be encouraged to conduct a demonstration. It will help to convince him of the accuracy of research findings.

There are several important factors that should be considered before establishing a nitrogen demonstration. First of all, every effort should be made to add adequate amounts of lime, potash and phosphate to the test field. Unless this is accomplished, one nitrogen fertilizer may produce more crop yield than another. Lack of potash, for example, would reduce the yield obtained from all sources. But if one material contained an accompanying element, like sodium, which has the ability to substitute for part of the potash needs of some plants, it might out-produce other nitrogen fertilizers without sodium. Also every effort should be made to have sufficient plants in the demonstration, and proper attention should be given to control of insects and diseases.

Another very important factor to consider is how to apply the nitrogen — bag-for-bag of product or pound-for-pound of actual nitrogen. To simplify this article, anhydrous ammonia and liquid nitrogen, which are good sources for crop production when applied properly, will not be used. Only solid materials, which are usually obtained in bags, will be discussed.

The most logical method to compare nitrogen fertilizers is on a pound-for-pound actual nitrogen basis. A bag-for-bag evaluation, unless each bag contained the same amount of nitrogen, would lead to false conclusions. A brief review of some basic facts will reveal why these two statements are true. For example, suppose one acre of cotton was sidedressed with three 100-pound bags of 16 percent nitrogen and an adjoining acre with three bags of 33.5 percent nitrogen. The three bags of 16 percent material would supply 48 pounds of actual nitrogen. This amount in addition to 20 to 36 pounds at planting would total 68 to 84 pounds of nitrogen. Without the advantage of improved methods of insect control, irrigation, defoliants, adequate plant population, etc., this is about the upper limit of nitrogen fertilization for average cotton production. The three bags of 33.5 percent nitrogen

Above: Test demonstration plots comparing effectiveness of nitrate of soda and ammonium nitrate fertilizers on cotton. **Below** P. J. Bergeaux, Extension fertilizer specialist, and J. S. Clegg, president of Walton County Farm Bureau, inspect corn demonstration on the Clegg farm.

would supply 100 pounds of actual nitrogen. This amount plus 20 to 36 pounds at planting would, in most cases, be an excessive quantity of nitrogen. A delaying effect on maturity and other plant processes would occur. Also the luxuriant growth and dense foliage produced would shade the plants. These conditions would probably favor the development of disease and insects to the detriment of ultimate yield.

An interesting example of the effect of varying rates of sidedress nitrogen on cotton production, using 16 and 33.5 percent nitrogen products, is shown below. The results are an average of ten 6-acre demonstrations conducted in all major areas of Georgia by the Extension Service in 1956.

Seed Cotton—Pounds Per Acre

Source	Pounds Per Acre Actual Nitrogen			
	24*	48	96	Average
Ammonium Nitrate (33.5% N)	1648	1717	1744	1703
Nitrate of Soda (16% N)	1616	1774	1774	1722

*Adequate mixed fertilizer applied at planting. Nitrogen in mixed fertilizer varied from 20 to 36 pounds per acre.

The two sources produced virtually the same cotton yield at each nitrogen application rate. Thus, on a pound-for-pound actual nitrogen basis, the two sources were equally effective. Assume that the two products, however, had been evaluated on a bag-for-bag basis, using three 100-pound bags of each product. Three bags of 16 percent nitrogen (48 pounds N) produced 1774 pounds of seed cotton. Three bags of 33.5 percent nitrogen (96 pounds N) produced 1744 pounds of seed cotton, or approximately the same yield as the 16 percent product. Thus, on a bag-for-bag basis, the 16 percent product would appear more efficient than the 33.5 percent product. On the other hand, suppose 1.5 bags of nitrate of soda (24 pounds N) had been compared with 1.5 bags of ammonium nitrate (48 pounds N). In this case, the 33.5 percent product would have appeared more efficient than the 16 percent product because it produced more yield. Such conclusions, of course, would be erroneous and meaningless.

It is easy to see the inaccuracy of a bag-for-bag evaluation. Little or no increase in cotton yield resulted above the 48 pound-per-acre sidedress rate with either the 16 or 33.5 percent nitrogen product. Nitrate of soda produced 1774 pounds of seed cotton at both the 48 and 96 pound-per-acre nitrogen rates. Approximately the same yield was also obtained with ammonium nitrate at both the 48 and 96 pound-per-acre nitrogen levels.

Results obtained from eight 6-acre corn demonstrations conducted by the Georgia Agricultural Extension Service in 1956, in which varying levels of 16 and 33.5 percent sidedress nitrogen were used, are also worthy of note and are shown below:

Corn—Bushels Per Acre

Source	Pounds Per Acre Actual Nitrogen			
	32*	80	160	Average
Ammonium Nitrate (33.5% N)	70	78	79	76
Nitrate of Soda (16% N)	68	76	80	75

*Adequate mixed fertilizer applied at planting. Nitrogen in mixed fertilizer varied from 16 to 20 pounds.

Pound-for-pound of actual nitrogen, no significant differences in yield were obtained between the two sources. These demonstrations add further proof to Experiment Station findings that nitrate of soda and ammonium nitrate are equally effective for corn production with a good soil fertility program. But on a bag-for-bag comparison, an erroneous interpretation of data would have resulted. Above 80 pounds of sidedress nitrogen per acre, only a slight increase in yield was obtained with either nitrogen source. Suppose, therefore, that five bags of nitrate of soda (80 pounds N) had been compared with five bags of ammonium nitrate (160 pounds N). Since little difference in yield was obtained between these two application rates, the nitrate of soda would appear to an untrained observer more effective than ammonium nitrate. Such a conclusion, of course, would be untrue because, regardless of which material was applied, the 160 pound-per-acre rate of nitrogen did not significantly increase corn yields above the 80 pound rate.

In summary, bag-for-bag nitrogen tests can be misleading to a person not familiar with the influence of nitrogen on plant growth. The only fair method of checking nitrogen fertilizers is on a pound-for-pound actual nitrogen basis. It is true that under certain soil and climatic conditions one nitrogen source may out-produce another. But most of the observed differences in yield can be explained by certain basic factors. Some of these factors, which govern the behavior of nitrogen fertilizers in soils and plants, are: **(1)** loss by leaching from the soil, **(2)** mobility or immobility in the soil, **(3)** effect on soil reaction and other soil properties, **(4)** content of secondary elements, **(5)** effect of soil reaction on availability and **(6)** form of nitrogen required by plants.

However, with proper adjustments in the time of application and with a sound soil fertility program, including adequate lime, these factors can be largely overcome. When this is accomplished, research has clearly shown that, pound-for-pound of actual nitrogen, one nitrogen fertilizer is as effective as another for the production of most major crops grown in Georgia. Therefore, farmers should be encouraged to purchase nitrogen on a cost-per-pound-of-element rather than a cost-per-ton-of-nitrogen carrier basis.

New St. Regis Multiwall

Tailor-made packaging, at considerable savings, has been adopted by the fertilizer industry. Better valve closure; reduced bag cost; improved package appearance; ease of opening; and better stacking, warehousing and shipping; all are features of the new St. Regis Paper Company pasted valve multiwall bag for fertilizer, according to the company. This new St. Regis development has been proven through more than a year's use in the field.

Link-Belt Issues Multi-Louvre Dryer Book

Multi-Louvre dryers and how they work are described in a new 16-page book just published by Link-Belt Company, which contains information on drying, cooling and processing of bulk materials and illustrates how the dryer is used in the coal, food, chemical processing and fertilizer industries for accurate temperature control and fast treatment of bulk materials. Book 2609 is available upon request and can be had by writing to the Link-Belt Company, Dept. PR, Prudential Plaza, Chicago 1, Illinois.

Money AS AN *Instrument* FOR AGRICULTURAL PROGRESS

by EARL COKE, *Vice President*
Bank of America, San Francisco

It is not my intention to give you a treatise on money—to discuss from whence it cometh or whither it goeth. In this age of speed and jets, velocity—including that of money—is of great importance. Indeed were it not for the added velocity of money in recent months the so-called tight money situation would be far more pronounced. Actually, as you are well aware, the tightness of money is not due to any dimunition in supply but rather to demands being in excess of supply. The extreme pressures of a rapidly expanding economy are straining the facilities available to finance expansions and at the same time care for the work-a-day needs. Added to this demand are the brakes which have been applied to our economy through the monetary policy of the Federal Reserve System. We see the results of this attempted slow-down in the uneven and irregular brake on our economy. The pressures of rising wage rates and strain created by increased government spending, along with expanding industrial plants, all have built up a demand for money of a magnitude never before experienced in our country except in war periods.

The progress which agriculture has made in this country is perhaps best described as a "technological revolution," for farm output has surpassed the wildest dreams of the past. Total farm output in 1955, for instance, was 60 per cent above output in 1920. And this was accomplished with 20 million fewer harvested acres and 11.4 billion fewer man hours of farm labor. Productivity per acre increased about 37 per cent on a national average, while the increase was 117 per cent for the Pacific states. During this same period, productivity per man hour in the United States increased 175 per cent. The number of persons supported by the production of one farm worker was about 4.3 one hundred years ago and was 8.3 in 1920. Today one farm worker supports in excess of 20 persons off the farm. All this indicates real progress, indeed, and the end is not in sight. In fact, the rate of increase seems to be accelerating in some areas and with some products.

When one examines closely the changes which have occurred in the physical input requirements of agriculture over the years, one sees that this tremendous decrease in land and labor per unit of output has been partly offset by an increase in capital. As the farmer sees it, money has been substituted for labor and land in the production process.

The biggest factor contributing to this change, of course, has been the mechanization of our farms—the industrial revolution of American agriculture. The number of farm tractors increased from 246,000 in 1920 to 4.5 million in 1956, and motor truck numbers have shown comparable increases. As a consequence, millions of acres of land and man hours have been diverted from the care and maintenance of horses and mules for power to the production of food and fiber for human consumption. The development of milking machines and crop harvesters of various kinds has further released human labor and made farm work less onerous.

Another very important factor accounting for the enviable record of progress agriculture has made is the use of fertilizers and chemical sprays. Here again, technically, farmers are substituting money for land and labor. There was more than 6 times as much fertilizer (nitrogen, potassium, phosphorous) applied in 1955 as in 1920. The use of these plant nutrients has increased 65 per cent since 1949. According to the latest census figures, farmers spent $1.1 billion for commercial fertilizers in 1954.

Farmers' expenditures for insecticides, fungicides, herbicides, etc., have increased 20 times since 1920. The estimated $400 million spent last year to purchase these chemicals dramatically points up the money required to obtain efficient crop and livestock production.

Needless to say, then, the capital requirements of agriculture have increased rapidly in recent years. The average value of land and buildings per farm in the United States has increased almost 4 times since 1940, **excluding** the value of machinery or the annual cash cost for fuel, fertilizer, sprays, etc. Today the capital investment per worker is higher for agriculture than for any other important segment of our economy and the farmer's need for money to meet operating expenses is higher than it has ever been before.

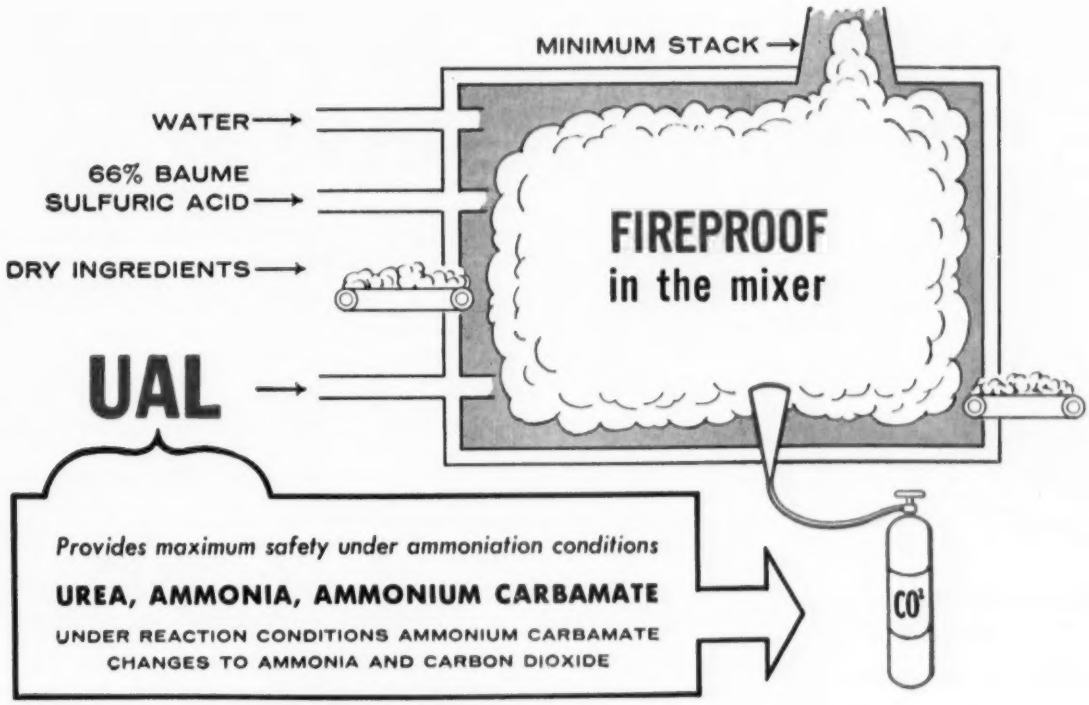
In spite of the increased demand for money throughout the economy, credit requirements for normal business and even some expansion in most segments of our economy are being met; especially is this true for agriculture. Here I am defining agriculture to include not only the farmers producing agricultural commodities but those in allied industries supplying the production goods such as chemicals and machinery, and the processors, distributors and handlers of agricultural commodities.

Since it is estimated that the industries and services included in our definition of agriculture account for 40%of our country's Gross National Product, and the employment of 40% of our labor force, the adequacy of the financing of all of these economic units is of great importance to our nation. It is of special importance to the agricultural chemical industry represented by you . . .

The basic question that needs to be answered, I assume, is whether agricultural credit, by its shortage or over-abundance, or by the forms in which it is available, has contributed to the relatively unfavorable position in which the producer of agricultural products finds himself today.

Admittedly, any attempt to answer this question must rely heavily on value judgements as to what constitutes agriculture's main problem, as well as on quantitative judgment as to the extent these problems are influenced by credit. In my opinion, agriculture's unfavorable position is caused, principally, because it has too many resources—

Presented at Spring Meeting of National Agricultural Chemicals Association, San Francisco, March 6, 1957.



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Fireproof conditions are maintained in the mixer when Du Pont UAL is used. As the ammoniation proceeds, the ammonium carbamate in UAL changes to ammonia and carbon dioxide. Ammonia enters the reaction and carbon dioxide displaces the air, thus creating conditions that guard against combustion.

Four formulations are available . . . all are equally safe for granulating. For technical assistance and information on the solution best suited to your use, write Du Pont.

HERE ARE OTHER IMPORTANT ADVANTAGES OF DU PONT URAMON® AMMONIA LIQUORS:

- High-quality nitrogen from UAL resists leaching . . . supplies both urea and ammonium forms of nitrogen.
- Won't corrode regular fertilizer manufacturing equipment, including ordinary steel and aluminum.
- Gives mixed goods better "feel"—minimizes caking, segregation and dusting.
- Suitable for either batch or continuous mixing.
- Prompt, dependable delivery enables you to schedule your production with confidence.

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particularly human resources—engaged in producing too much of the wrong kind of commodities.

According to a recent study conducted by the Federal Reserve System, "Farm debt has been growing in the last several years while farm incomes were declining. In mid-1956 all farm debt (exclusive of Commodity Credit Corporation price advances) totaled $18.5 billion, about 6% higher than a year ago and larger in dollar amount than at any other time. . . . With continued growth in size of farms (up 12% since 1950) and mechanization, the average farm investment in land and other assets is now about 75% greater than it was in 1947. Reflecting these factors, and smaller farm incomes, farmers have depended upon credit to an increasing extent." Borrowed funds and credit are supplied from many sources — both private and public—banks, insurance companies, individual lenders, dealers in machinery and farm supplies, processors, feed dealers, agencies of the Farm Credit Administration, Farmers Home Administration, Commodity Credit Corporation, Agricultural Conservation Payments, Federal Crop Insurance, Rural Electrification Administration. Whatever the source, the supply of money has a profound effect on the farmer's ability to expand, to acquire production goods, and to market or store commodities.

When we consider total farm debt as a per cent of total assets, farmers are still in a strong financial position, although they have been losing ground a little in this respect the last 5 years. Currently farm debt outstanding is about 11% of the value of total farm assets and about 95% of present liquid or financial assets. In 1940 comparable figures were 18.5% and 200%, while in 1950 they were 9% and 70% respectively.

To get a clearer picture of the farm credit situation, we should separate real estate mortgage debt from non-real estate debt, and then examine the sources of credit in each category.

Farm real estate mortgage debt of the United States now totals $8,962 million, which is an increase of $786 million over 1955 and $3,383 million over 1950. This outstanding real estate indebtedness as of January 1, 1956 was held by:

Federal Land Banks	17%
Life insurance companies	25%
Commercial banks	15%
Individuals and others	40%
Farmers Home Administration	3%

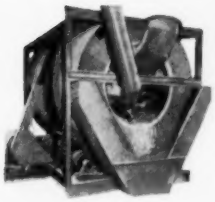
For Western United States the percentage of mortgage debt held by individuals was markedly in excess of the United States average, reaching 62% for the three Pacific Coast states. Our knowledge concerning this credit category is limited. We do not know the terms of the loans, for instance, nor do we know their rates. Likewise we are not certain who is holding this paper, although this large volume of real estate mortgages in the hands of individuals undoubtedly represents the willingness of farmers and others to accept this type of paper as an investment in order to avoid heavy income tax or to consummate a sale that could not be financed by regular lending agencies due to legal or policy limitations.

The preponderance of the total farm mortgage debt represents the purchase and improvement of land. Supposedly, if the supply of farm mortgage credit were inadequate the growth in agriculture's capacity to produce would not keep pace with the growing demand for agricultural products. From a review of studies made by the United States Department of Agriculture and by the land-grant colleges, as well as from the President's Materials Policy Commission study, one can only conclude that the long-run needs for agricultural products (as seen at the time of these studies) could easily be met by foreseeable expansions in our agricultural plant. In fact, most analysts conclude that surplus agricultural capacity will be with us for some time.

Conceivably this situation could change rather quickly if we continue attempting to underwrite our expanding role in world leadership. Some excess capacity in our agricultural plant may be a very desirable and economical form of insurance when faced with high uncertainty about our needs. However, there is little evidence supporting any claim that limited credit is preventing a desirable expansion in our agricultural plant.

Another indication of the adequacy of farm mortgage credit is the trend in agricultural land prices which have increased about 64% as an average for the United States over the past 10 years. Even during the period 1952-1955, when farm incomes were falling every year, land values continued to rise. Today, agricultural land values as indicated by sales are in most areas greatly in excess of values justified by incomes derived from these lands.

NEW STAR* OF THE SACKETT GRANULATING TEAM



SACKETT AMMONIATOR
A performance-proved machine combining the desirable T.V.A. submerged ammoniation design with Sackett time-honored rugged construction. Select the size you need from 15 to 60 tons per hour.

SACKETT STAR* GRANULATOR
This new machine has been called "The Missing Link" so badly needed in granulation. It performs the important job of forming a far greater portion of the initial feed into pellets of acceptable size. Select yours from a complete capacity range from 15 to 60 tons per hour.

The Sackett STAR* Granulator is an entirely new and revolutionary approach to the granulation of fertilizer mixed goods.

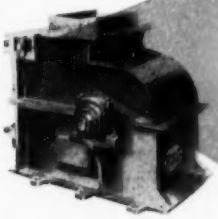
Here's what the STAR will give you:

CONTROLLED GRAIN SIZE
New concept of grain size control. Larger percentage thru 6 on 16 mesh range, smaller portions of under and oversize.

HIGHER PRODUCT RECOVERY
Up to fifty percent increase in product recovery, because of its inherent, vigorous rolling—*not sliding*—action.

HIGHER PRODUCTION CAPACITY
More granulation the first time through, means substantially higher production capacity.

LOWER DRYING COST
Higher percentage of on-size in initial granulation means less fuel cost per ton due to lower hydration of total feed.



SACKETT BAR MILLS
This is the first mill, to our knowledge, that has been designed specially for use in *cracking* . . . not pulverizing . . . the granular oversize from the final product classifying screen. Its gentle impact action on the material accomplishes desired size reduction with minimum formation of fines.

Established Fertilizer producers are invited to get our up-to-the-minute counsel on their conversion and expansion programs. It is available without cost.

OTHER SACKETT PRODUCTS

Batch Weigh Systems

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SACKETT COOLERS
No other manufacturer offers such a complete selection of sizes and capacities. Rugged construction and highly efficient dust control are two of their noteworthy features. Infinite number of diameter and length combinations assure you of just the right one for your capacity and space requirements.

SACKET DRYERS
These highly efficient direct heat gas or oil-fired units are built to give many years of service in spite of the severe conditions under which they must operate. Unique tuyere design combustion chamber assures reduced chemical losses and maintenance costs. Built in sizes to meet every capacity requirement.

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Architects and Manufacturing Engineers to the Fertilizer Industry Since 1897.

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POTASH RAISES FARM INCOME. The successful American wheat farmer. He knows all there is to know about plowing, planting and harvesting. He knows the value of potash-enriched fertilizers, too. If he cared to talk about his success, he'd probably tell us he replenishes the potash in his soil every year. And every fall, like clockwork, he reaps the full healthy crop that is his due. Chances are he spends no more time in the field than any other farmer. A little wiser, that's all.

USP's Higrade muriate of potash is free-flowing and non-caking and has the highest K_2O content—62/63% K_2O. Also available, USP's Granular muriate of potash contains a minimum of 60% K_2O.

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Part of this pressure on increased land values comes from existing farmers who feel compelled to expand their operations in order to obtain increased efficiency made possible by technological advancements. Furthermore, there is the pressure from "suburbia" as some farmers "seed their land to subdivisions." Not only do these farmers receive fancy prices for this land but they, in turn, move further out on the periphery to reinvest these funds. The fact that their capital gains tax is waived if they reinvest in agriculture within a specified time period induces additional pressures on land values. Then, too, there has been a rather heavy flow of capital from successful lawyers, doctors and businessmen into agriculture in the last 10 years. As one businessman said recently, "Not only does my ranch provide me a pleasant place for an occasional trip to the country and provide an income tax deduction, it also makes me a little money." All of these forces combine to create a capital burden on some agricultural lands that farmers find as heavy to bear as Sinbad found the old man of the Sea.

With such high land prices relative to capitalized returns, institutional lending agencies can finance only a portion, if any, of a sale. However, the fact that farm real estate mortgages are held by others in such volume seems to indicate no shortage of credit in this field. Certainly our need is not for more people to enter agriculture, but for more people to leave agriculture. One advantage of the current high land prices is the encouragement it offers those farmers on uneconomical-sized units, or those whose management practices are below standard, to get out of agriculture into some occupation offering them greater opportunity.

Since 1950 there has been a reduction of 600,000 farms in the United States. It is estimated that one-third of all farm sales were for the purpose of adding to existing farms. For the most part, farmers sold their property voluntarily and with financial gain.

I find no indications that the form or terms in which long-term capital flows into agriculture exerts an adverse effect on the kind of commodities produced. That is, the flow of long-term capital does not seem to direct production away from those commodities most desired by consumers. In this respect, it is neutral.

Let us turn next to non-real estate farm loans in the United States. These include loans for livestock, crops, machinery and chemicals, and totalled nearly $6,303 million as of January 1, 1956. This was an increase of only $67 million over 1955, and $1,741 million over 1950. Commercial banks held the major amount of these outstandings or 71%. Production Credit Associations held 10.3%. Farmers Home Administration 6.4%, Federal Intermediate Credit Banks 1% and Commodity Credit Corporation 11.3%. Unfortunately the data available do not accurately reflect the total volume of seasonal loans to agriculture but only loans outstanding as of one particular time. Furthermore, January 1 is the low period in the year for loans outstanding, but it is our most recent figure.

There has been much discussion in recent times of the need for intermediate credit for agriculture. One state farm organization passed a resolution at its recent annual meeting stating that there may be a need for "loans for two to seven years bridging the gap between short and long term credit . . . for the purchase of machinery and equipment, improvement and construction of farm buildings, and establishment of some types of livestock operations." This would indicate there is need for a type of credit not now available, although I find it difficult to determine just where the vacuum exists. The Federal Reserve System in its recent analysis of agricultural lending by insured banks showed that in the United States 33.4%, or $1,285 million, of all agricultural loans outstanding as of June 30, 1956 was in this intermediate-term field. These included loans for acquiring machinery, livestock, autos and other consumer goods, and for improvement of land and buildings. Twenty-seven per cent of the money loaned by all insured commercial banks in the United States for these purposes had a maturity of two years or more, and ranged all the way to 10 years duration. It would appear therefore that although there may be some types of intermediate loans not now available there are substantial sums available to service loans of this kind.

Let us now return a little closer home and discuss the commercial bank's place in making money available to farmers. As stated earlier, commercial banks held 71% of our farm non-real estate loans outstanding as of June 30, 1956. How they make this money available is important to the farmers and to you in the agricultural chemical field. Three general methods are used:

1. The discounting of paper held by those selling production supplies to farmers.

2. Unsecured lines of credit for seasonal operations and expenses.

3. Loans backed by crop and chattel mortgages.

While loans in the last two categories, i.e., unsecured lines of credit and those secured by chattel mortgages may be made for a few specified purposes, in general and by far the largest volume are set up to finance all the out-of-pocket costs of production. When I say all, I mean all. Experience has amply demonstrated the folly of undertaking a financing obligation which does not include provision for all items and operations necessary for efficient production, such as spray materials and fertilizers.

Once the bank or lending agency has made a commitment to finance a farmer's seasonal requirements, there is no turning back in mid-stream. To do so may not only bring disaster on the borrower but the lender might find himself an unwilling partner in a distressed business. Besides, it is an indication of poor planning and business management on his part.

Therefore, **before** entering into a financial relationship with a farmer, the anticipated cash outlay for expenses as well as anticipated returns from sales should be carefully projected through the season. In our bank, we do this by means of an operating budget worked out together by the farmer and a lending officer or agricultural field man. Each production expense is itemized and all potential income calculated.

If, as a result of this analysis, a probable pay-out with a reasonable cushion is not indicated, the banker had better withdraw unless there is another source of income. It is a service to no one to plunge a person into debt when little opportunity for a profitable outcome exists for the venture.

The history of increased borrowings by farmers made necessary by increased costs, the use of vastly more production goods such as machinery, equipment and chemicals, and the enlarging of farms, in itself speaks well for the helpful relationship between lender and borrower.

(Concluded on page 68)

Random Notes & Quotes

In the air. Items in the batch on our desk . . . Rural Marketing devotes a two-column feature to the idea that aerial fertilizing of forests will increase plant food sales. They refer to the highly successful operation in which Nitrogen Division teamed up with Rutgers to apply fertilizer from the air over an 11 acre stand of red pine on the University's Dairy Research Farm. They point out that woodlands are largely in big acreage holdings, that working over forests is less hazardous to the flyer than crop dusting . . . and wildlife will benefit. They used 12-12-12 in the experiment and the forester shows growth increases from 40% to 65%.

Another: You've seen this one if you've travelled any super-highways almost anywhere in the US lately . . . grass seed and fertilizer being blown onto the banks of cuts from machines they tell us costs only $1000 and does 25 to 35 acres a day. Seems the Virginia State Highway Department's landscape superintendent, L. E. Geris, doped it out. That's where we first saw the idea in operation, last May.

O

Prices on chemicals for crops went down, it seems since 1952. Anhydrous and other nitrogenous fertilizers shrunk 20%; potash declined 16%; commercial insecticides were slashed 50%, according to an O.P.D. price study.

O

Shock treatment apparatus may soon be used on plants to improve germination, dry grain, process food and kill weed seeds. Thus a gadget invented by O. A. Brown of USDA, which is a tube through which stuff flows, to be subjected to radiation from low frequency electrical energy. Not too different, really, we imagine than the fundamentals of the flash-pasteurization method used since the 1930's by the milk industry. But a fine new application.

O

Legal controls and more of them are needed to protect humans and other animals from misuse of crop chemicals. That, at least is the opinion of a speaker at the Missouri Veterinary Medical Association meeting recently. He is H. E. Whitemire, head of a St. Louis research lab.

O

City tenant farmer, Henderson, Ky., has one. They recently made a contract with a man to plant corn on 40 acres belonging to the city, to split the cost of fertilizer and seed, and to divide the proceeds. Fair enough. The Devil makes work for idle lands to do!

O

Alaska is so rich in mineral wealth that the surface has only been scratched. And as the scratching goes deeper, and new electric power to help . . . there's a new market for fertilizers.

O

Grass that hardly grows at all because of a spray that holds it back has brought a surge of hope to the embattled lawnmower jockeys of the world. Maleic hydrozide is the stuff. On a test lawn it reduced the cuttings from 16 to 2 in a season. And that's pretty wonderful to us, for our yard man failed to turn up yesterday, and our grass is getting out of hand. Please pass the MH!

O

Evidence vanished when they did some plant food tests on grassland in South Carolina recently. The cattle specialized on the properly fertilized grass; ate up all the evidence. This has happened before, and will again. And it helps prove that animals are pretty smart about what

they eat . . . except perhaps horses which will founder themselves if you give then half a chance .

O

Feathers are going to be taken into court. You've read here and elsewhere about feathers being made into plant food. Now there is one guy who says he patented the idea, and some 28 who say it's old stuff. So the court will be filled with lamentations . . . and feather merchants.

O

Electrons that sterilize the soil without changing its fertility, if that's not a contradiction of terminology, may be with us soon. At the U of Cal. they used a high intensity beam, and it worked. The newspaper where we saw this said they used 9 million "votes" . . . but this is agronomy we're talking, not political science.

O

Flowers are growing more abundant for two reasons. People have more time to plant them, and more money to buy plant food for them. Just think what things will be like when the 30-hour week comes along. We should live so long!

Research Results and Reports

Partnership in research is a project by Diamond Alkali and Ionics, Inc., working closely together.

O

Nematode research conference was sponsored recently by Shell's crop chemical unit. A faculty of 10 experts told the folks what has been learned.

O

Mite grant. University of Kentucky has been given $15,250 to study mites and how to get rid of them. National Science Foundation gave $10,000 . . . the rest came from Rockefeller Foundation.

O

Safety for crop chemicals was the subject of a considerable article in a recent DuPont publication (actually excerpts from a talk made by Bill Hogan, whom you may have heard at the Clearwater, Florida Soils and Crop meeting) because, as Bill said, it is traditional with DuPont to do the research that proves safety before they distribute anything in the crop chemical field to the public.

O

FTE has been demonstrating what it can do in all sorts of conditions lately. The most recent the supervised field tests in the Yakima Valley which showed that trace elements, notably boron, can check pear decline, which has been a serious economic problem up there. And in Minnesota 100 foot rows of potatoes showed a nice yield increase over untreated rows, when FTE went on at the rate of 30 pounds per acre.

O

10 years can be taken off the time it requires to grow pulpwood by the use of fertilizer in the forest, a Nitrogen Division man reveals. The Japs have been proving it. DuPont has a booklet by Dr. Takeo Shibamato of Tokyo University if you care to read up on it. Write Dr. Crittenden, at 40 Rector St., New York 6.

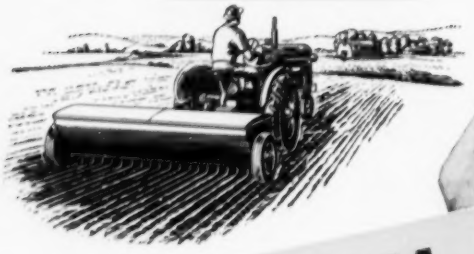
O

Dyestuffs, such as acid magenta, will help prevent caking in ammonium salts and chemical fertilizers.

O

Trees that had had "wet feet" for 15 years and, though well fed, had underdeveloped roots, perked up when mulched with hay—just plain hay. The good things in life may not be free, but at least they need not be complicated.

TENNESSEE CORPORATION



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For Direct Soil Application

As in all U. S. Phosphoric Products, Granular Triple Superphosphate is produced under the most exacting chemical and physical controls to furnish you and your customers a product of consistent uniform particle size, completely dust free with low moisture content that will not cake or lump in storage or bridge over in the hopper. It drills free to provide the desired amount of plant food through even, uniform flow and distribution.

RIGID QUALITY CONTROL
Through Six Basic Chemical and Physical Analysis

HIGH WATER SOLUBILITY
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CF Staff-Tabulated TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by Cooperating State Control Officials and Tabulated by COMMERCIAL FERTILIZER Staff

	February		January		Oct.-Dec. Qtr.		July-December		January-June		YEAR (July-June)	
STATE	1957	1956	1957	1956	1956	1955	1956	1955	1956	1955	1955-55	1954-55
Alabama	.....	79,427[1]	20,141	22,494	101,280	103,377	174,707	165,867	813,104	846,735	1,029,030	1,114,238
Arkansas	.....	33,986[1]	13,161	15,229	26,759	26,729	59,915	60,299	299,172	270,894	359,471	330,781
Georgia	47,427	47,499	33,574	41,187	168,751	170,229	253,559	250,968	993,954	1,047,875	1,244,422	1,273,445
Kentucky	.....	35,730[1]	53,927	55,413	50,075	58,090	88,346	91,478	441,481	431,024	529,600	522,410
Louisiana	26,266	22,925	10,761	12,716	46,979	36,496	71,129	59,345	214,343	232,781	273,688	310,848
Missouri	50,189	55,852	27,720	33,953	154,331	192,239	331,343	356,241	450,102	414,503	804,441	682,690
N. Carolina	.....	178,075[1]	74,933	86,554	148,970	163,008	216,234	225,182	1,424,267	1,566,158	1,649,449	1,830,633
Oklahoma	8,877	11,191	.....	1,944[1]	29,343	29,195	54,509	69,542	65,854	63,799	135,396	122,204
S. Carolina	120,593	123,996	39,286	41,629	79,910	78,592	122,929	119,947	743,670	796,111	863,617	928,715
Tennessee	.....	13,554[1]	6,492	3,399	107,591	95,140	165,796	154,260	378,676	355,966	515,551	523,349
Texas	.....	52,179[1]	34,255	27,459	130,969	117,563	202,406	193,704	377,805	375,176	566,399	588,062
California	(reports compiled quarterly)				231,361	188,204	412,747	361,615	639,377	603,657	1,001,554	922,127
Virginia	(reports compiled quarterly)				78,509	91,645	154,075	162,709	599,111	636,585	761,820	795,770
Indiana	(reports compiled semi-annually)						305,939	255,131	807,918	873,966	1,063,049	1,158,960
Iowa	(reports compiled semi-annually)						85,147	130,000	315,329[1]	.....	445,329[1]	.....
Michigan	(reports compiled semi-annually)						.....	.....	443,908[1]	.....	.....	.....
N. Hampshire	(reports compiled semi-annually)						.....	.....	13,168[1]	.....	.....	.....
Washington	(reports compiled semi-annually)						.....	48,749[1]	103,288	124,186	152,037	182,348
TOTAL	253,352	261,463	313,250	340,033	1,354,828	1,350,507	2,698,781	2,656,288	8,352,122	8,639,506	10,949,524	11,286,580

..... (not yet reported) * Not compiled [1] Omitted from column total to allow comparison with some period of current year.

MARKETS

ORGANICS: There has been no noticeable change in the price of fertilizer organics during recent weeks and the movement continues steady. Leather Nitrogenous Tankage is currently priced at $3.25 to $4.00 per unit of Ammonia f.o.b. production points.

Activated Sludge prices continue at previous levels of $2.95 per unit of Ammonia and 50c per unit of APA, bulk, f.o.b. at a Midwestern source, with another production in the Southwest priced at $3.00 per unit of Nitrogen and 50c per unit of APA, bulk.

CASTOR POMACE: Limited supplies of this material are just being produced in recent weeks but all of it was committed sometime ago. Price is nominally $45.50 per ton, in bags, f.o.b. Northeastern production points.

DRIED BLOOD: The Chicago market is currently $6.00 to 6.25 per unit of Ammonia for sacked unground Blood. The New York market is around $4.75 to $5.00.

POTASH: Movement of this material from domestic sources is in seasonal dimensions. Prices continue firm and unchanged.

GROUND COTTON BUR ASH: Movement of this Potash source continues steady. Current analyses are running about 38% to 40% K_2O and delivered cost compares with Sulphate of Potash for most areas.

SUPERPHOSPHATE: Production figures for both concentrated and normal Superphosphate continues somewhat behind the same period for last season but prices remain steady and somewhat higher than last season.

PHOSPHATE ROCK: Stocks remain comfortable and prices steady.

NITRATE OF SODA: Movement continues in good volume throughout the Southeast with several months left in the season for this popular form of Nitrogen to move. Primary use for this is direct application.

CALCIUM AMMONIUM NITRATE: Prices continue firm for the leading brands of this 20.5% Nitrogen which is priced at $44.00 per ton, bulk and $48.00 per ton bagged, f.o.b. Atlantic and Gulf ports. Demand is good and movement in fair volume.

GENERAL: Extended rains in the Southeast have delayed the movement of fertilizers somewhat but improvement is being noted in the volume of sales. The soilbank program has, in many areas, resulted in considerable decrease in consumption of fertilizers.

INDUSTRY CALENDAR

Date	Organization	Place	City
May 3-4	NPFI Chem. Analysts School	Purdue Univ.	Lafayette, Ind.
June 9-12	NPFI	The Greenbrier	White Sulphur Springs, W. Va.
June 17-19	Sou. Control Officials	Dinkler-Tutwiler	Birmingham, Ala.
July 10-14	Plant Food Producers of Eastern Canada	Manoir Richelieu	Murray Bay
July 18-19	SW Fert. Conf.	Buccaneer Hotel	Galveston, Texas
Oct. 17	Chem. Control Procedures	Shoreham	Washington, D.C.
Nov. 3-5	CFA	St. Francis	San Francisco
Nov. 6-8	Fert. Indus. Round Table	Sheraton Park	Washington, D.C.

FARMERS MUST FACE REALITIES GRANGE OFFICIAL SAYS

"Farmers of the nation must face realities in the development of farm program patterns for the next decade." That's the opinion of Herschel D. Newsom, Master of the National Grange, who says "three general approaches are being offered.

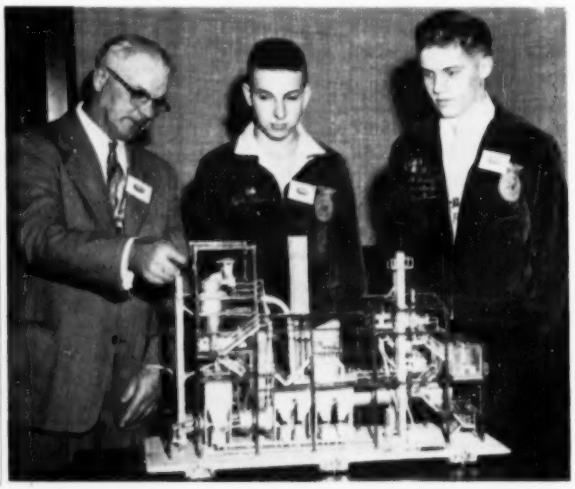
"One approach," according to Newsom, "is to progressively lower levels of price support, allowing prices to take their normal course, as dictated by the law of supply and demand, and in this manner seek to remove Government interference with normal market patterns.

"The Grange is intent on modifying programs that have, and are certain to continue to channel major portions of agriculture's production into and through Government hands. To progressively lower price supports is to deny the actual existence of a farm income problem or the need for any effective measures to supplement farm income.

"A second alternative," the farm leader continued, "is to raise levels of support and invoke a system of controls that would regulate the production of all crops and livestock in an effort to justify maintenance of a seemingly desirable price. This alternative is likewise ineffective in the matter of raising farm income and does gross violence to the principle of freedom to operate and manage one's own farm assets.

"The third route is that of designing programs that will preserve the function of price in the market place, and at the same time protect farm income. In such a manner, recognition can be taken of the mounting costs of farm production and of rural living. At the same time we can guard against both the farm income inequity of the one approach and the loss of liberty of the other."

Two of the top participants in Spencer Chemical Company's annual Efficient Corn Growing Contest examine a model of a fertilizer granulation plant. Bob Ehlers and Herbert Kraeger, both Vocational Agriculture students at Plattsmouth (Nebr.) High School, shown here with Bob's father, Otto Ehlers, were among 34 top participants selected in the annual demonstration of efficient corn production methods sponsored by Spencer. Although increasing efficiency and use of up-to-date practices were stressed above an attempt at maximum yield, the average of all the "new practices" plots harvested by the winners was 114 bushels as compared to 74.6 bushels for the "old practices" plots. Despite greater expenditures for fertilizer, seed, herbicides and pesticides on the new practices plot, the increase in yield also brought a decrease in unit cost of production. Average per bushel cost on the "new" plot was 62 cents, 20 cents less than it cost to raise a bushel of corn on the "old" plot.



BRIGHT DAYS AHEAD FOR FOLKS ON SMALL FARM, SAYS MAGAZINE

"Small farms, like small businesses, are on the way out" is a statement heard in some quarters today. However, Farm Journal, which recently studied the situation and talked with farm folks, believes that the family-size farm has a definite future. We agree says Spuds Johnson in a recent issue of the U. of Fla. Agricultural News Service."

One fact is indisputable: The situation is changing, just as all segments in a dynamic economy will continue to change. This flexibility has been one of the outstanding characteristics of the American farmer: that is, he is willing to change or adapt whenever the need arises.

For instance, some small farmers believe that the way to continue farming is to specialize. Florida farmers have long ago learned this lesson, often limiting their production to some animal or crop that they can produce at an economic advantage over some other farmers. Good examples of these are the tomato, flower, and citrus grower and cattle rancher. Florida has shown other farmers of the nation that specialization pays off.

Still another way the small farmer can compete is by selling directly to the consumer, raking in profits that might otherwise go to the middleman. Roadside stands have cropped up as a fine way to market produce from the small farm. Excellent variations of these stands are the home-style butcher shops where fresh or smoked meat and poultry are sold at handsome profits.

Part of this is due to a wider appreciation by Americans for products of the craftsman, of which the specialized farmer is an excellent example. This is shown by the willingness to pay a premium for quality in such items as home-cured hams, fresh-dressed turkeys and chickens, or sweet corn right off the stalk.

Farm Journal quotes one farmer as saying: "People want quality and service and are willing to pay for it. The small farmer can give personalized service that the big farmer and stores can't." This ace that the small farmer holds can mean the difference between being able to stay on the land or packing up and moving to town.

Regardless of the place in the nation, it seems there will remain a place in the sun for the little farmer as long as he is willing to meet the challenges of the changing times. Millions have already proved this.

A BOOM IN RESEARCH

It is a very heartening sign, this year when people are given to biting their nails over the future, that there is what really amounts to a boom in research. Even a cursory reading of our pages will show that fertilizer ingredient people are very busy expanding research capacity, and adding new research projects. In addition to which there is a surprising amount of money being awarded to colleges for additional work . . . all leading to the same end: Better plant food techniques, in the factory and on the farm.

It is a boom that will turn out a boon to agriculture, and to the nation as a whole. Let us hope that the same kind of vision that has been granted our people be also granted to other industry. As we read in the papers and the magazines so often lately—our future depends on brain rather than brawn. We must train both, of course,—but it is the brain category that we seem to be lagging behind Russia.

And that's no place to be caught lagging!

SAFETY....

by C. E. Franklin
Phillips Petroleum Company
Presented at the Fertilizer Section of the Southern Safety Conference, Richmond, March 3-5.

SAFE HANDLING OF
AMMONIA, AMMONIUM NITRATE and NITROGEN SOLUTIONS

Anhydrous ammonia, nitrogen solutions, and ammonium nitrate are nitrogen carriers and one or more are found in general use at almost all fertilizer plants. The handling of each of these nitrogen materials is a safe and non-hazardous operation when the proper handling procedures are employed. Much has been written and said on the recommended handling procedures of these materials, however, it is still sometimes alarming to note the laxity and carelessness with which these materials are sometimes handled in fertilizer plants. We think it worthwhile to review the hazards involved and to recommend several general suggestions as to their safe handling.

Anhydrous Ammonia

Let us first review the properties of ammonia. Anhydrous ammonia, containing some 82% nitrogen by weight, is the most concentrated source of available nitrogen used by the fertilizer industry. At atmospheric pressure and at normal temperatures ammonia remains in the form of a gas. However, when it is compressed it turns to a liquid and it is in this form, under pressure, that ammonia is customarily handled. Because it is stored as a compressed gas it does require pressure equipment and a more specialized technique for handling.

Commercial grade ammonia as used by the fertilizer industry is usually shipped in 11,000-gallon insulated tank cars of proper I.C.C. specifications designed for pressures of 300 psig. When you spot your ammonia car for unloading be sure the brakes of the tank car are set and the wheels are blocked. The first procedure in connecting your ammonia car should always be to place the regulation blue metal sign, "STOP — TANK CAR CONNECTED," on the track at least 25 feet from the switch end of the car. If the siding on which the car is spotted in a blind siding, only one sign is required, however, if your siding is one which can be entered from either end, two signs, one for each end, are required.

After the tank car is properly spotted and protected, you should have the following safety equipment available for workers who are to engage in unloading operations:

1. Respiratory equipment, approved by the United States Bureau of Mines to be used in strict compliance with the manufacturer's instructions. You may use a conventional canister type industrial full face mask for ammonia gas concentrations of 3% and under for a brief exposure period. If gas concentrations exceed 3%, is unknown, or if exposure is prolonged, you should use supplied-air respiratory equipment of proper design with full face masks and proper clothing.

2. Protective clothing, consisting of hats, rubber suits, gloves and shoes, should be available at all times for emergency use. Encourage the use of rubber gloves whenever a worker is breaking an ammonia connection. Safety goggles should be worn at all times when handling ammonia.

3. It is recommended that your fertilizer plant be equipped with emergency equipment in the form of a safety shower and a bubble type drinking or eye wash fountain located as closely as possible to the area where ammonia is being handled.

Your tank car connections should be made with synthetic rubber inner tube and braided hose with high pressure couplings, with hose and couplings having a minimum bursting pressure of 1250 psig. The hose manufacturers have done an excellent job designing hose for use with anhydrous ammonia and can recommend their type for this service. Hose is still one of the more vulnerable points of all the ammonia handling equipment used as it deteriorates more rapidly than most any piece of equipment. It is recommended that you replace all of your hoses after two years of service. Some hoses might last a lot longer but to be on the safe side you should consider the life of the hose as two years—and take care of your hoses during those two years. If you have off seasons when the unloading system is not in use, disconnect your hoses and store them inside in a dry place. Protect your unloading hoses. Don't let them sit out unnecessarily in the weather.

When unloading from an ammonia car equipped with excess flow valves, a valve which will close with the sudden surge of liquid such as could be experienced with a ruptured hose or line, open the liquid unloading valve on the tank car full open. Do not attempt to throttle with this valve for the possibility exists that if a rupture should occur the surge of liquid might not be great enough due to the throttling action of a partially closed valve to close the excess flow valve.

As you are no doubt aware, all of the ammonia codes emphasize one point of upmost importance—that no valves, fittings, or other components used in contact with ammonia be made of brass, bronze, copper or any of its alloys. This is because of the chemical action of ammonia which leads to the quick disintegration of these non-ferrous metals. The materials specified for all components of an ammonia handling system are iron, steel and stainless steel. This means that usual types of pressure regulators, pressure gauges, brass valves, bronze seated unions and galvanized fittings and pipe are not suitable. Since ammonia is handled under pressure, it is necessary that units used in an ammonia system are designed with the strength factors required to hold the pressure encountered. Because of its inherent lack of required strength, never use cast iron pipe fittings or valves in ammonia service.

Ammonia piping should be extra heavy, Schedule 80, black steel or iron in all cases where screwed

Gaither Newnam, left, personnel and safety director of Coronet Phosphate Co., is shown accepting on behalf of Coronet the large trophy awarded by the Smith-Douglass Co., Inc., for Coronet's top safety record during 1956. Making the presentation is Vernon Gornto, safety director of Smith-Douglass.

Douglass Safety Trophy Goes To Coronet Plant

The Ralph B. Douglass trophy has been awarded to the employees of the Coronet Phosphate Company, a division of the Smith-Douglass Company, Inc., for their outstanding safety record for 1956. The big bronze trophy was presented by Vernon S. Gornto, Safety director of Smith-Douglass during a monthly meeting of the safety committee. R. M. Wilber, manager of the Coronet division, accepted the trophy on behalf of the employees.

The 12 plants of Smith-Douglass compete for the award. Gaither Newnam, safety director of Coronet, said he was proud of the record set and especially of the employees of the Tenoroc mine near Lakeland who have worked 1,200,000 man hours without a lost-time accident.

"The operations at this mine are hazardous but the employees there have put into practice a conscientious safety program which has resulted in this new record," Newnam stated.

He attributed much of their success to an enthusiasm and desire to carry out a good safety program, including the instructing of men new to the jobs in ways of working safely.

The Coronet Phosphate Company was acquired by Smith-Douglass in 1952 and the present safety program was organized under the supervision of Mr. Gornto in 1953 with B. J. Phillips as safety director.

Chemical Construction Wins Safety Award

National Constructors Association announced four safety awards to member companies. Two of these awards, given annually to companies which establish safety records based on frequency and severity of injuries lower than the Association average, were received by **Chemical Construction Corporation,** New York and **Koppers Co., Inc.,** Pittsburgh.

joints are used. Standard weight, Schedule 40, pipe may be used providing the pipe joints are welded or joined by means of welding flanges. Do not use screwed fittings with Schedule 40 pipe. In order not to subject your piping to undue stress or strain, you should always have incorporated adequate provisions in your piping layout for expansion, contraction, jarring, vibration and settling.

As you are no doubt aware, the volume of liquid ammonia expands with temperature. It is for this reason that ammonia tanks are never filled liquid full as the expansion of a liquid can create terrifically high pressures. Now this point should never be overlooked with regard to your ammonia lines. Wherever you have an ammonia line where there is the possibility of trapping liquid ammonia in between shut-off valves the line should be equipped with a safety relief valve venting to the atmosphere at a safe location. It is recommended that start to discharge pressure of such relief valves be not less than 350 psig and not in excess of 400 psig. The discharge from safety relief devices should never terminate in or beneath any building.

After the installation is properly engineered and all the equipment is in top working order, the human element enters the picture. These are your men for whom all the proper equipment has been designed. However, if the personnel are not trained in their proper use, the best designed equipment will not prevent accidents. A new operator should never be allowed to handle anhydrous ammonia until he has either been apprenticed to a skilled operator or has been taken step-by-step through the complete operation by a supervisor. This checkout should include not only operating procedures but a thorough indoctrination regarding the hazards of ammonia and in the use of the protective equipment and the recommended first aid procedure to be followed in case of exposure. Your plant workers must realize that ammonia must be respected, but there is no reason why it should be feared if it is handled with due caution.

Anhydrous ammonia will burn within very narrow limits. A mixture containing 16 to 25 per cent gaseous ammonia and air is flammable. This concentration rarely occurs in the handling of ammonia as a fertilizer, therefore, ammonia is generally considered to be a non-inflammable gas. Nevertheless, it would be foolhardy to do any welding or cutting around lines or tanks containing ammonia vapors. When welding on lines or equipment is required, they s h o u l d first be purged or washed free of ammonia. Blank off the ammonia lines before doing this work, do not depend on shut-off valves.

The presence of oil, or a mixture of ammonia with other combustible materials will increase its fire hazard.

If you should have an ammonia leak which cannot be valved off, use large volumes of water directly on the leak. Water has a very high affinity for ammonia.

For additional and complete information on the recommendation on standards for the handling of ammonia, you should have available at your plant for all to study who work with ammonia or ammonia handling equipment one or more of these three booklets:

1. Chemical Safety Data Sheet SD-8 of the Manufacturing Chem-

ists' Association. This is a very good safety pamphlet and may be obtained for 30 cents from the Manufacturing Chemists' Association, Washington, D. C.

2. Pamphlet G-2 of the Compressed Gas Association.

3. Standards for the Storage and Handling of Anhydrous Ammonia prepared by the Engineering Standards & Standardization Committee of the Agricultural Ammonia Institute, Memphis, Tenn.

Ammonium Nitrate

Let us now turn our thoughts to the handling of ammonium nitrate, a solid form of nitrogen now handled in most all fertilizer plants. Now that ammonium nitrate is manufactured in a satisfactory form, well packaged, and properly transported and stored it has experienced a terrific growth as a fertilizer material. Its usage has increased from 18,000 tons in 1943 to 925,000 tons in 1955.

Ammonium nitrate is classed chemically as an oxidizing material. This means that the oxygen which it contains can support combustion if it is involved in a fire with combustible materials. Therefore, ammonium nitrate must be handled and stored so it does not become mixed with other products which will burn.

Recognizing that ammonium nitrate will burn and to better understand ammonium nitrate, let us review the effect of heat on nitrate. Ammonium nitrate is a very stable material up to its melting point of 337°F. When heated to temperatures 70° to 80°F above the melting point, 410° to 420°F, ammonium nitrate will start decomposing slowly to nitrous oxide and steam. The decomposition of the material in this temperature range is not spontaneous, that is, it must have heat added to continue the decomposition.

Now, as temperatures are increasing to 500° to 550°F the decomposition products begin to include free nitrogen and oxygen and the decomposition reaction gives off heat. Since any chemical process which produces gas and heat is potentially explosive, there are conditions under which the high temperature decomposition of ammonium nitrate can proceed at an explosive rate or may produce explosive effects.

From a safety standpoint you should train your people engaged in the handling of nitrate to handle and store ammonium nitrate in such a manner so as to eliminate the possibility of ammonium nitrate from being exposed to elevated temperatures in the range of 400°F and above which may cause its decomposition. As a guide for this program, the following storage recommendations adopted from the proceedings of the Conference on Ammonium Nitrate Fertilizer of the National Research Council of Canada are considered good practice.

1. Bags of ammonium nitrate fertilizer should be stored not less than thirty inches from the storage building walls in piles not more than twelve feet in width, with thirty-six inch aisleways between piles.

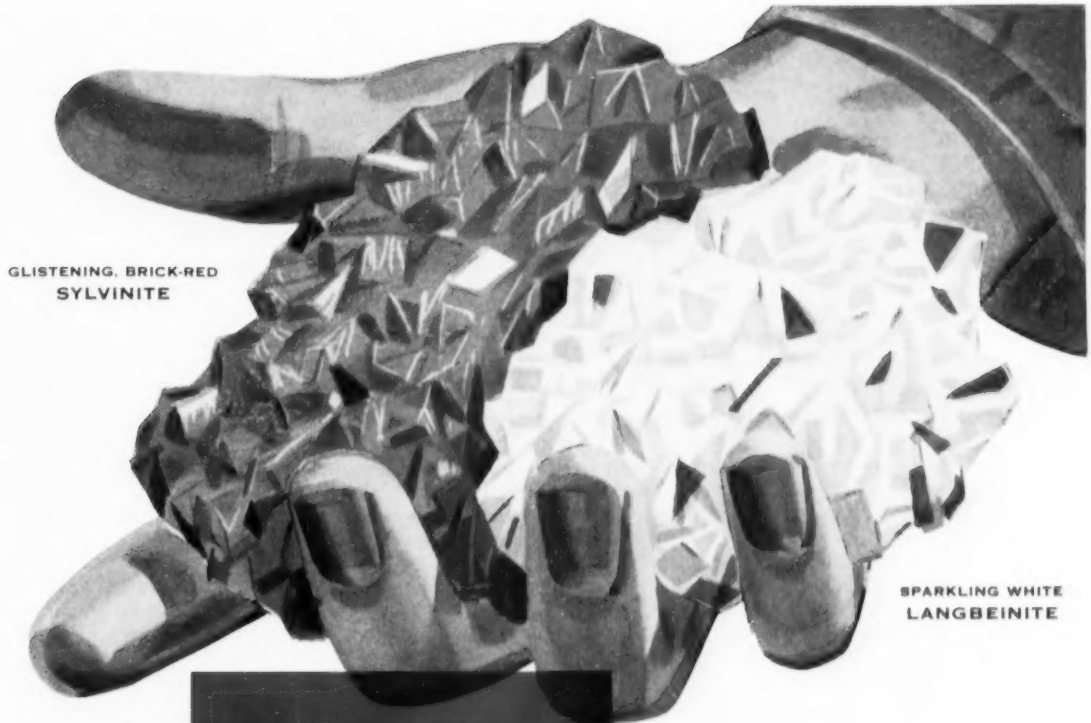
2. Ammonium nitrate fertilizers should not be stored over or under any organic chemicals, inflammable liquids, corrosive acids, chlorates, finely divided metals, sulfur or other combustible materials.

3. The material should not be stored closer than three feet from steam or hot water pipes, radiators, heating devices, or electric wiring and fittings; including switches.

4. Spilled nitrate should be cleaned up promptly and disposed of. A broken or cracked bag containing uncontaminated fertilizer may be salvaged by placing it inside a clean new slip-over bag and closing securely.

5. Fire hydrants should be provided exterior of the storage spaces and conveniently placed with adequate hose available and capable of extension to all parts of the storage.

Should fire break out in an area



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SOUTHERN SAFETY CONFERENCE ELECTS SPENCER'S C. J. WILSON

The eighteenth annual meeting of the Southern Safety Conference, Richmond, Va., March 3-5 brought out more than 50 to attend the fertilizer section. Elected were C. J. Wilson, Spencer Chemical, chairman; W. D. Smith, Southern States Cooperative, vice chairman; Milton J. Hattler, Southern Cotton Oil, secretary.

Including the talk which is reproduced in full, a fine group of speakers filled two afternoon sessions with practical material on the many phases of safety in fertilizer plants: W. D. Smith on "Dollars and Cents in Safety"; Stan Roberts on "Pile Reduction and Dynamite"; these made up the first session.

The second afternoon was devoted to a panel discussion on the good a safety program can do our industry. Vernon Gornto, moderator, with Grayson Morris, A. H. Haeberle, Mike Ellison, W. A. Stone and Ann Turbeville as panelists.

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where ammonium nitrate is stored, it is important that the nitrate be kept cool and that the burning be extinguished promptly. Large volumes of water should, therefore, be applied as fast as possible. It is a very good idea to have two and one-half gallon water pump cans located in the warehouse for extinguishing small fires.

Apply the water directly to the ammonium nitrate as instantaneous cooling is the desired objective.

Inasmuch as ammonium nitrate is an oxidizing material capable of supplying oxygen sufficient to maintain combustion, conventional methods to smother the fire with chemical extinguishers, such as carbon dioxide or carbon tetrachloride, are of doubtful benefit for combating fires involving ammonium nitrate. Also, do not apply steam as an extinguishing agent as the heat of the steam will increase the temperature of the nitrate and increase the hazard.

Irrespective of the normal reaction of ventilation increasing the severity of a fire, it is recommended that doors and windows be opened to provide as much ventilation as possible. It should be remembered that high temperatures are to be avoided.

Vapors from burning ammonium nitrate are toxic. Do not breathe fumes generated in a fire involving ammonium nitrate. Always fight such fires from the upwind side if possible. In event personnel are required to enter buildings, warehouses, or box cars to combat ammonium nitrate fires, where ventilation is inadequate, wear fresh air hose mask or self-contained oxygen breathing apparatus.

Additional information on the properties and recommended methods of packaging, handling, transportation and storage of ammonium nitrate can be found in Manufacturing Chemists' Association Manual Sheet A-10 on ammonium nitrate.

Nitrogen Solutions

One third nitrogen material to be considered here is the ammonium nitrate type nitrogen solutions. Since nitrogen solutions, which are the most widely used source of nitrogen in fertilizer manufacturing plants in the United States today, are a mixture of ammonia, ammonium nitrate and water in various ratios the same general precautions should be followed in the handling of the ammoniating solutions as observed for handling ammonia and ammonium nitrate.

From a handling standpoint the physical properties of solutions differ from anhydrous ammonia in two main respects. First, nitrogen solutions in general have a much lower vapor pressure than ammonia, one psig for the 37 per cent solution at 104°F to 50 psig for the 49 per cent solution at 104°F. Secondly, the ammonium nitrate in solution results in a material that is corrosive in nature to many more materials than is ammonia alone. The lower vapor pressure along with its corrosive nature and nitrogen solutions to carbon steel has made aluminum a very popular and satisfactory material for transporting, handling and storing nitrogen solutions.

Nitrogen solutions are shipped in 8,000 and 10,000-gallon tank cars. Most of the tank cars are equipped with lead or aluminum rupture discs. The bursting pressure of the discs are stenciled on the tank car along with the maximum recommended unloading pressure which is several pounds below the bursting pressure for the rupture discs. As it is customary to unload nitrogen solutions cars by air pressure it is important that you check your air regulators so as to never exceed these maximum recommended pressures.

Piping, fittings, and valves for all types of nitrogen solutions should be in order of preference, stainless steel, aluminum, or black iron. Diaphragm valves are best with lubricated plug-cock valves as second choice. In the case of batch operations where measuring or weighing tanks are used, the tanks should be of all welded or aluminum construction equipped with pressure relief valves venting to the outside atmosphere. As with ammonia, no copper, brass, bronze or galvanized material should be used anywhere in a nitrogen solutions system.

As you know, different grades of nitrogen solutions crystallize or salt out at different temperatures. Your plant production superintendent should anticipate the probable minimum atmospheric temperatures to be encountered and select a solution which offers no salting out hazards.

If salting out in your lines should occur do not apply heat to lines which are plugged or closed at both ends. Your solutions lines should be equipped with adequate union connections for convenient dismantling of lines for cleaning if salting out should occur at your plant. Have tees or crosses installed in place of ells on your solutions line to permit cleaning with rods.

In regard to the use of light bulbs near gauge glasses and rotometers, it is highly recommended that you use a bulb housed in a vaporproof housing with explosion proof electrical fitting. Fires have been caused by nitrogen solutions spraying on light bulbs.

Most all of the suppliers of nitrogen solutions have technical service departments to assist customers in the proper installation of equipment and in methods of handling the product, so it would be well for any user to take advantage of this service when contemplating making new installations or modifying old ones.

In closing I would like to emphasize that there is no reason why ammonia, ammonium nitrate or nitrogen solutions cannot be safely handled providing these four cardinal rules are observed:

1. Approved installations.
2. Knowledge of physical properties.
3. Available safety equipment.
4. Competent operators.

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MORE PICTURES

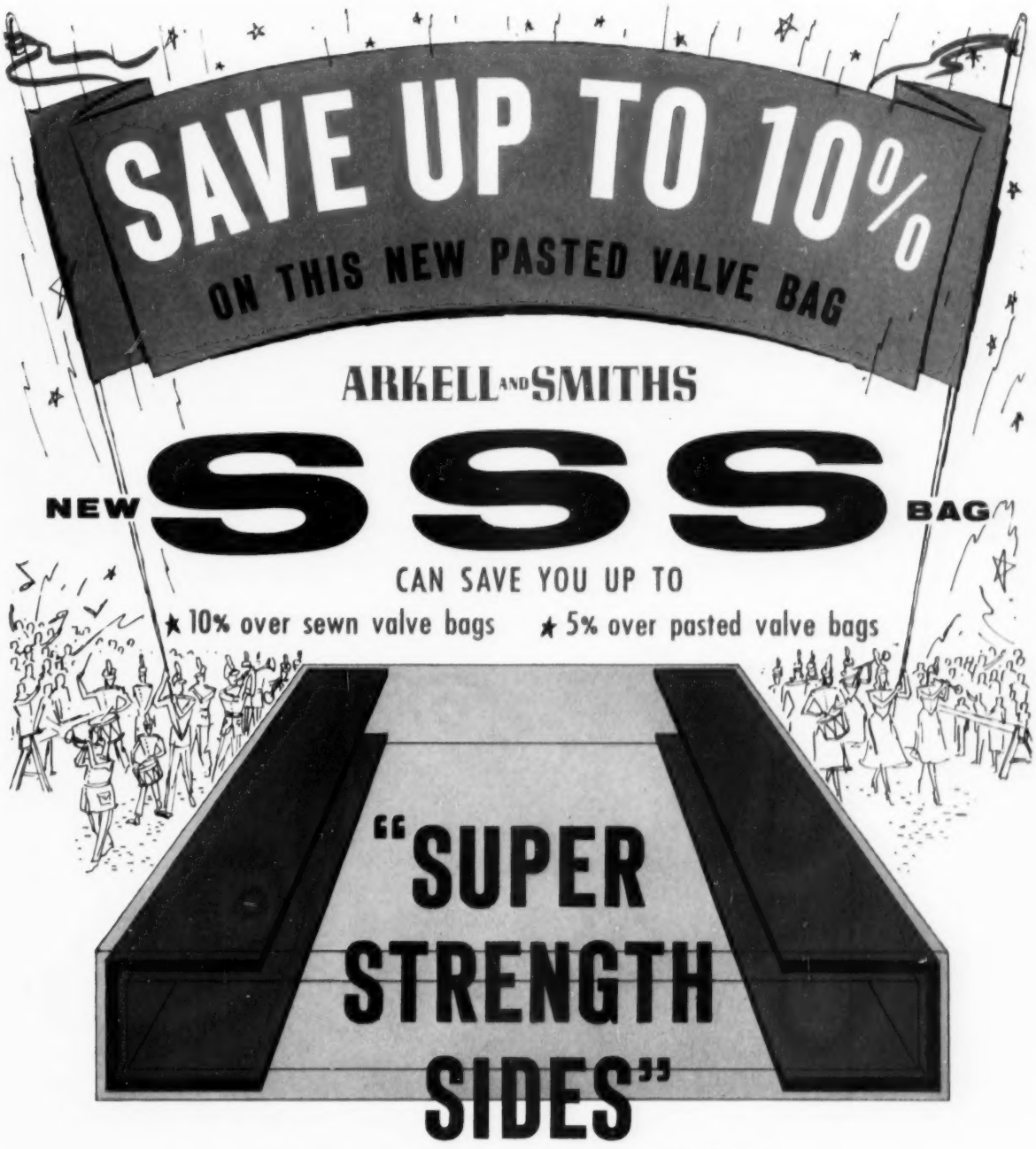
from the recent meeting of Middle West Soil Improvement Committee with College Agronomists at Chicago

AND ON PAGES 54 & 55

Photos by MWSIC Staff

1. Middle West Soil Improvement Committee Board of Directors (standing, left to right) M. A. Smith; E. T. Potterton; Dan Williams; W. M. Newman, Z. H. Beers, executive secretary; M. A. Blue, George Kingsbury; J. D. Stewart, Jr.; W. W. Venable; (seated) L. E. Quiram, treasurer; R. Bennett, Pres.; R. G Fitzgerald, Vice Pres.
2. Among speakers at the Joint Meeting were: W. A. Albrecht, University of Missouri; S. A. Barber, Purdue University; J. F. Davis, Michigan State University; Leo Puhr, S. Dakota State; K. C. Berger (chairman) University of Wisconsin; Walter Mumm, Crow's Hybrid Seed Co.; C. M. Woodruff, University of Missouri.

1. Joe Stough, U. S. Potash Co., and Ray Pavlak, Wisc. Farmco Service.
2. C. E. Trunkey, G. A. Barley, and Z. H. Beers, MWSIC.
3. G. W. Bunting, Cent. Farmers Fertilizer Co., and Guy Tanner, Illinois Farm Supply Co.
4. C. P. Goodale, Commercial Solvents Corp.
5. W. G. Duncan, Purdue University.
6. A. R. Mullin, Indiana Farm Bur. Coop., H. R. Lathrope, Nitrogen Div., Allied Chemical & Dye Corp., and A. E. Peterson, University of Wisconsin.
7. Russell Ayes, Grace Chemical Co.; John Abbott, Ashkum Fertilizer Co., and Thiel Post, Post Fertilizers.



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ADDRESS_____
CITY_____ ZONE_____ STATE_____

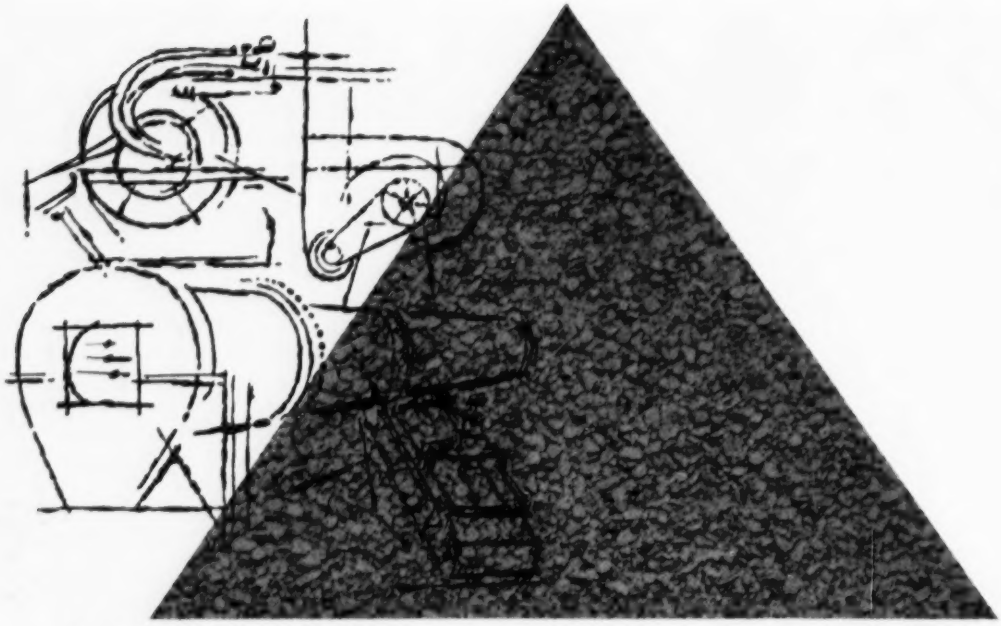
Photos by MWSIC Staff

Key to Picture at left

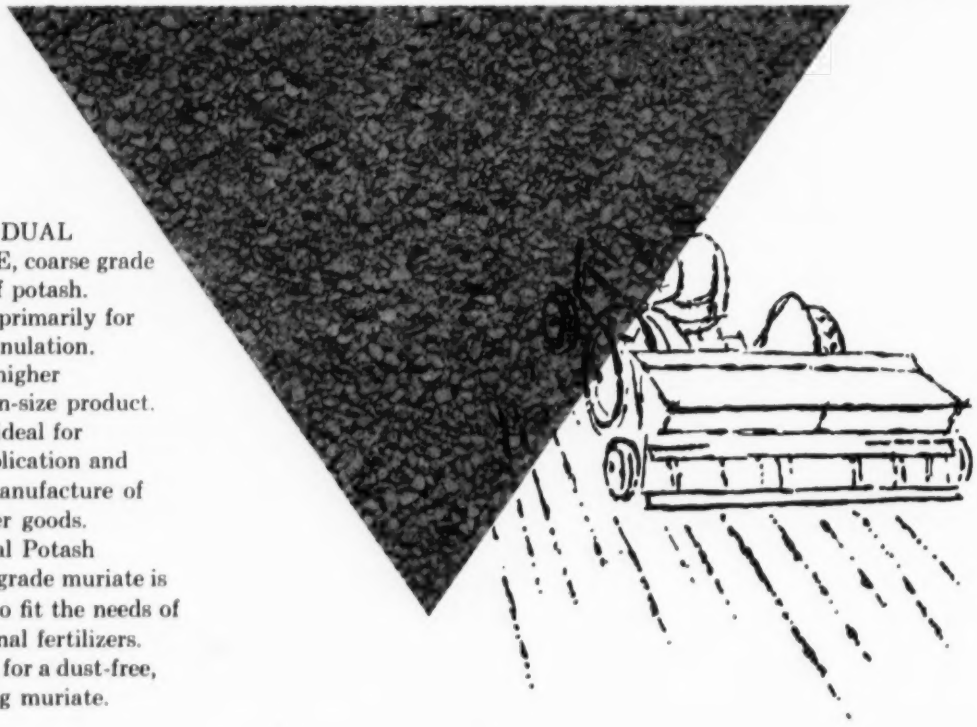
1. J. R. Taylor, Jr., Grand River Chemical Div., Deere & Co., and D. R. Griffith and D. L. Senko, University of Illinois.
2. C. A. Simkins, University of Minnesota; F. N. Calvin and H. C. Zuch, Farmers Union Cent.
3. W. M. Sime, Spencer Chemical Co., H. E. Wood, Farmers Fertilizer Co., and Kaspar Peter, Phillips Chemical Co.
4. Ed Carbon, Mrs. Grace Koos Anderson, N. S. Koos & Son.; Harry J. Raffery, Hudson Pulp & Paper Co.
5. H. G. Cunningham, Tenn. Corp.; Bill Lehman, Chilean Nitrate; George Walton, Tenn. Corp.
6. Robert Garn, Farm Bur. Coop., Assn.; Harry Cook, Ohio Farm Bur.
7. C. R. Sparks, Buhner Fertilizer Co.
8. W. W. Venable, Cornland Plant Foods, and J. D. Zigler, International Minerals & Chem. Corp.
9. Floyd Smith, Kansas State College.
10. M. P. Wilson, Harrison & Crossfield and E. W. Bankston, Farmers Union Cent.
11. S. A. Barber, Purdue University.
12. G. R. Blake, University of Minnesota, and H. F. Rhoades, University of Nebraska.
13. Leo Orth, Sinclair Chemicals.
14. C. M. Woodruff, University of Missouri, and S. J. Aldrich, University of Illinois.
15. W. H. Pierre, Iowa State College; Allan Leffler, Pioneer Hybrid Seed and M. W. Mawhinney, Smith-Douglass Co.
16. C. L. W. Swanson, The Texas Co.; Henry Plate, Eastern State Farmers Exchange, and Lee R. Hays, The Texas Co.
17. C. A. Johnson, Phil F. Stocker, Land O' Lakes Creameries.
18. A. J. Ohlrogge, Purdue University.
19. Howard Lathrope, Nitrogen Division, Allied Chemical & Dye Corp., George Enfield, USDA.
20. G. L. McGuffy, Sohio Chemical Co.; J. Walter Harding, Federal Chemical Co., and K. C. Berger, University of Wisconsin.
21. M. B. Russell, University of Illinois.
22. Bernie Manker, Davison Chemical Co., and Cash Cahill, National Potash Co.
23. Fred Ioerger, Marion Plant Life Fertilezer Co.; and Allan Leffler, Pioneer Hybrid Seed Co.
24. R. G. Fitzgerald, Smith-Douglass and Ray Sorensen, Cornland Plant Food.
25. Sam Farmer.

Key to pictures on page 55

1. Ken Keith and Harold Bingham, Spencer Chemical Co.; J. L. Sanders, Mississippi River Chemical Co.
2. Rex Reagan, W. P. Glaspey and W. T. Thompson, Blue Valley Fertilizer Co., and Jim Menn, U. S. Industrial Chemical Co.
3. M. D. Weldon, University of Nebraska; R. E. Bennett, Farm Fertilizer, and John Sargent, Federal Chemical Co.
4. O. J. Attoe, University of Wisconsin; E. C. Doll, University of Kentucky, and John T. Murdock, University of Wisconsin.
5. Phillip R. Smith, Monsanto Chemical Co.; D. L. Senko and D. R. Griffith, University of Illinois.
6. George D. Failes, H. C. Zuch and Frank N. Calvin, Farmers C. Central Exchange.
7. L. E. Quiram, Illinois Farm Supply; Laurie Peterson, Midland Coop., and R. A. Fancher, Welcome Agricultural Chemical Co.
8. Eldon Powel, Illinois Farm Supply; Dick Balser, Spencer Chemical Co., and Jerry Mitchell, National Fertilizer Co.
9. H. B. Mann, American Potash Institute; H. H. Tucker, Sohio Chemical Co., George Wickstrom, and Werner Nelson, American Potash Institute.
10. N. T. White, Marshall Smith and Harti W. Lucks of Smith Agric. Chemical Co., and Ray White, Spencer Chemical Co.
11. G. R. Blake, W. P. Martin and J. H. MacGregor, University of Minnesota.
12. John H. Wiley, Cent. Farmers Fertilizer Exchange.
13. George Kingsbury, Kingsbury & Co.; Ed Kolb, American Potash & Chemical Corp., and James L. Schell, Kingsbury & Co.
14. Warren Huff, Ashcraft-Wilkinson, Leo Orth, Sinclair Chemicals and George Scarseth, American Farm Research Association.
15. Earl Neuman, Ohio Farm Grain; J. G. Nesbit, Republic Steel Co., and C. F. Martin, Miami Fertilizer Co.



LET NATIONAL POTASH SERVE YOU



Here is a DUAL PURPOSE, coarse grade muriate of potash. Designed primarily for use in granulation. It gives a higher yield of on-size product. It is also ideal for direct application and for the manufacture of top dresser goods.

National Potash standard grade muriate is designed to fit the needs of conventional fertilizers. Processed for a dust-free, non-caking muriate.

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ALABAMA

Covington Fertilizer Co., Andalusia, has decided to suspend operations, "because of the fertilizer price situation and the poor prospects for future profits" according to **C. F. Booth,** president.

ARIZONA

Southwestern Agrochemical Corporation are building at Chandler a 60 daily ton contact process sulphuric acid plant, designed by **The D. M. Weatherly Company,** Atlanta, and constructed by **Utah Construction Company,** San Francisco. Southwestern is also under construction with the first plant to employ the Weatherly DiaPhos process. **The J. B. Ehrsham & Sons Mfg. Co.,** Enterprise, Kansas, fabricated the equipment from Weatherly designs, with Utah Construction as general contractor.

CALIFORNIA

Ranch Chemicals, Inc. is to be the name of the $16,000,000 plant—reported here last month—being organized by a group of San Joaquin Valley farmers and cotton gin operators. Articles of incorporation were filed last month. The concern would produce and trade in anhydrous ammonia, nitric acid, ammonium nitrate and other nitrogenous fertilizers. Among the incorporators are **Tilford Cheney,** president of **Ranchers Cotton Oil,** Fresno, and **Edwin Newfeld,** president of **Calcot Ltd.,** which markets 25% of the state's cotton crop. It is estimated that the 24 cooperative gins in the Valley alone would require 15,275 annual tons of NH_3 and these represent only 25% of the cotton ginned in the state. Other incorporators include **John Squire,** Lemoore (not Stratford as reported last month); **Stanley Newton,** Stratford; **Richard Huth** and **Clyde Hash,** Visalia; **W. L. Higgens,** Earlimart; **T. A. Davis,** McFarland.

• • •

The Triangle Co. Salinas was the subject of a 32 page special section in the local newspaper celebrating their 30th anniversary. Starting in Salinas, they have expanded over the years until their plants and dealerships cover all the great agricultural areas of California from Wheatland south. Last year they bought **Southern California Fertilizer,** 51 year old Los Angeles concern, and just this January they bought control of **Nitrogas** of Fresno, adding 11 anhydrous distribution points to their chain.

Triangle deals in a full line of fertilizers and crop chemicals. **W. E. Simas,** founder and president of Triangle, has been a pioneer not only in the distribution of fertilizer, but in the development of application as well as production equipment. 70 employees are headed by Mr. Simas, **Earle E. Kaplansky,** vice-president and treasurer; **Virgil A. Frizzell,** vice-president and general manager.

CONNECTICUT

Naugatuck Chemical is tripling the size of its research station at Bethany, testing ground for a wide range of crop chemicals being developed by this division of **U. S. Rubber.**

COLORADO

Brancucci Chemical, liquid fertilizers and crop chemicals, has sold its Denver building and property to **Woodbury Chemical** of St. Joseph, Mo., producers of crop chemicals. Brancucci will continue to operate its plant at Henderson.

FLORIDA

Foremost Fertilizer, Leesburg, have completed the addition to their plant which gives them storage for 2500 tons of mixed goods, and includes scales and an elevator for loading bulk transports and spreader trucks direct from supply. They are now adding two rooms to their office building, according to **N. A. Lockett,** general manager.

• • •

Hurricane Fertilizer, Miami, are doubling plant capacity, spending more than $175,000. Capacity on completion will be 30,000 annual tons. Hurricane is a division of **Re-Mark,** and the plant was purchased last Fall from **R. W. Brown Co.**

• • •

Dixie Flo-Mix, Dunellon, recently staged a demonstration of liquid fertilizer application with a fish fry at noon. The Flo-Mix plant at Dunellon has recently been opened, with **H. H. Keel,** vice president of Dixie as general manager, **Joe L. Cobb** is company president.

• • •

Everglades Fertilizer, Ft. Lauderdale, founded in 1935 by **John B. Dye, Sr.,** has developed into the semblance of a local pharmacy, which whips up a "prescription" as needed by the soil. Sons John and A. M. are now in the concern which turns out 22,000 annual tons. Working closely with the Florida AES and "supplying the farmer a shoulder to cry on" this unusual operation serves a wide area in South Florida.

• • •

A major Florida phosphate producer has pointed to the two-way haul of coal and phosphate rock as a means of effecting great savings in fuel costs for the people of that state, as well as in freight for the multi-million dollar phosphate industry.

William H. Wilson, president of **Virginia-Carolina Chemical Corp.,** asked both the Atlantic Coast Line and the Seaboard Air Line Railroads to consider the transportation of coal south into Florida and phosphate on the return haul north, thus reducing freight rates substantially.

In telegrams to the presidents of both lines, Wilson asked what his company may expect in the way of development of the two-way hauls. He requested prompt action "as we desire to give serious consideration to the possibility of using water transportation ourselves if we cannot realize important economies by using the railroads."

GEORGIA

Ocilla Oil & Fertilizer, Ocilla, is in operation with its expanded plant, 40,000 extra square feet of space that permit mixing of 1000 daily tons. **Otto Griner** is manager.

IDAHO

U. S. Steel's nitrogen products line, now in production in the Geneva Works at Provo, Utah, was laid before fifty fertilizer dealers assembled at Salt Lake City late in February. **Frank E. Adams** is western sales manager.

• • •

Central Farmers Fertilizer's annual meeting in February authorized let-

ting of contracts for the long-contemplated $13,500,000 phosphate fertilizer project in southeastern Idaho, near Georgetown. The plant is to be open for business by October 1; next year. The plant will use an electric furnace process to supply calcium metaphosphate for co-ops in the river basins on the Ohio, Missouri and upper Mississippi rivers.

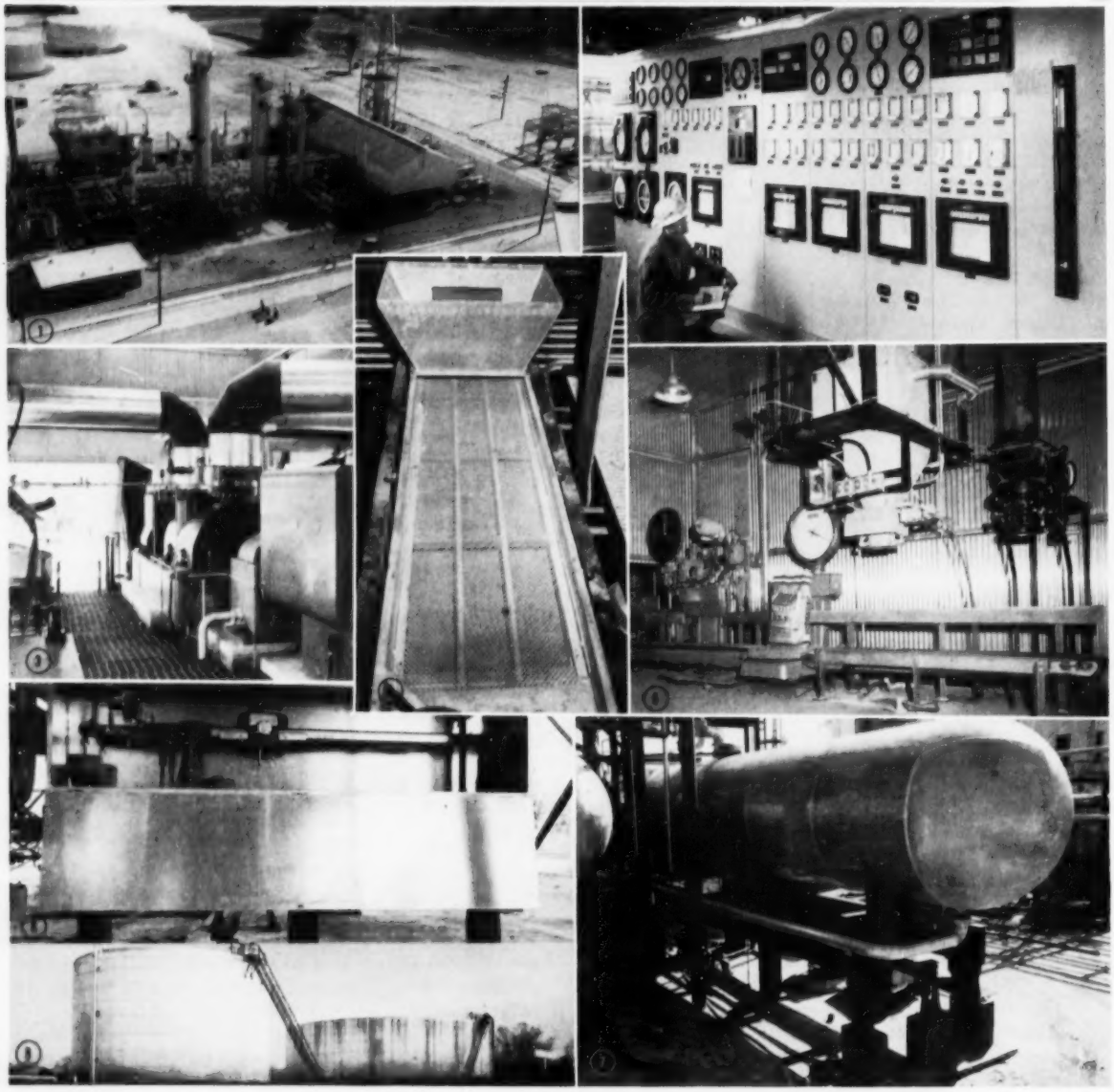
ILLINOIS

U. S. Industrial Chemicals Tuscola plant is on stream and is expected to turn out 30,000 annual tons of phosphorous pentoxide as a supplement to their nitrogen and sulphuric lines. The plant operates on license from **Prayon** via the wet process. It was designed and built by **Singmaster and Breyer.** According to **L. C. Byck,** heavy chemical sales manager, it is the "first plant in the U. S. built for the primary purpose of supplying phosphoric acid to fertilizer manufacturers, and Tuscola is the only point in the U. S. where all three major fertilizer ingredients are produced for fertilizer manufacture."

Highlight Pictures of Southern Nitrogen Plant

Southern Nitrogen Company shipped their first car recently from the new plant at Savannah, which cost around $14,000,000 and which is expected to do $9,000,000 in annual sales. The plant turns out when in full operation 250 daily tons of anhydrous ammonia and 30 of urea. Annual production of Dixie Ammonium nitrate will be about 60,000 tons.

Pictures: 1. A general shot of the plant. 2. The ammonia plant control room, from which one operator can control the entire operation. Similar controls centralize handling of nitric acid, ammonium nitrate, urea and prilling plants. These panels incorporate the very latest instruments for the highest degree of quality control. 3. Some of Southern's methods were borrowed from jet plane research. For example the gas turbine here uses the hot tail gases from the nitric acid cycle in such a way that while it takes 6000 horsepower to start the nitric compressor, the motors can be cut back to 3000 HP for operation. 4. One of the screens used in the prilling plant, to assure uniform particle size, which rejects and passes back into solution oversize particles. 5. Instead of a tenth-bag spot check, Southern Nitrogen weighs every bag as it is filled, and every product is double-checked for weight, measure and specifications before shipment. 6. These scales weigh ingredients—those in solution are weighed in huge scale-mounted batch tanks, which hold two tank carloads each. 7. Pressure tank for the addition of ammonia to nitrogen solutions. 8. The storage tank on the right is the first of its kind in the US. In Switzerland and Canada it has demonstrated it can sharply cut ammonia vapor waste.



"Can't afford costly delays because of torn bags,"

says Harlan Jackson, Montgomery, Alabama farmer. "We buy fertilizer in burlap bags because we can handle them as roughly as we want. Then too, the re-use and resale value of the bags are big reasons for burlap. We make a nice cash saving from bag returns over the year, and we keep some empties for countless uses around the farm."

The resale value of the burlap bag gives your customer a cash discount on every ton of fertilizer he buys.

Just ask your own customers—

they'll tell you that burlap

Is strong — takes dragging, dropping, *man-handling* — any tough job on the farm.

Gives good ventilation — keeps farm supplies and products fresh.

Laughs at sudden showers — wetness or dampness can't weaken it.

Saves money — extra value from re-sale and re-use.

Saves storage space — stacks to any height without slipping.

Has 1000 uses — always in demand on the farm (popular with farm wives, too!)

THE BURLAP COUNCIL

of the Indian Jute Mills Association

155 East 44th Street, New York 17, N. Y.

Sole Chemical Corporation, Chicago, has been formed to render a customized technical service to chemical processors, including formulators and manufacturers in the field of emulsifiers for crop chemicals. **Solomon Epstein,** formerly executive vice-president of **Emulsol Chemical** and its general manager, heads the new concern with executive headquarters at 27 East Monroe St., Chicago. **Herman Zagerinsky,** formerly in production control at Emulsol is now Sole's manager of production.

• • •

Hartin Implement Co., Roanoke, have nearly completed their new liquid fertilizer plant, which will, according to **Lewis Martin,** lead off with custom application, but also will serve farmers who have their own application equipment for weed and insect control which may be adapted to liquid fertilizer.

INDIANA

Rauh and Son Fertilizer's, Plymouth plant has begun a two-step expansion program . . . granular fertilizer first, to be followed by a superphosphate plant. The plans were announced by **R. D. Martinet** of the Indianapolis headquarters. **F. H. Perrin** is superintendent of the Plymouth operation.

• • •

Mid-South Chemical are installing another anhydrous ammonia bulk

USI Now In Production On Phosphoric

U.S.I.'s new phosphoric acid plant at Tuscola, Ill. (on which we have reported step-by-step progress) has now been completed and put on-stream, announces Dr. R. E. Hulse, vice president of National Distillers Products Corp. and general manager of the U.S. Industrial Chemicals Co. Division. Production capacity of the new plant is 30,000 tons per year, expressed as P_2O_5 (equivalent to approximately 60,000 tons per year of 75% phosphoric acid).

The new phosphoric acid plant of US Industrial Chemicals at Tuscola, Ill. Below is the giant filter, which is the heart of the process.

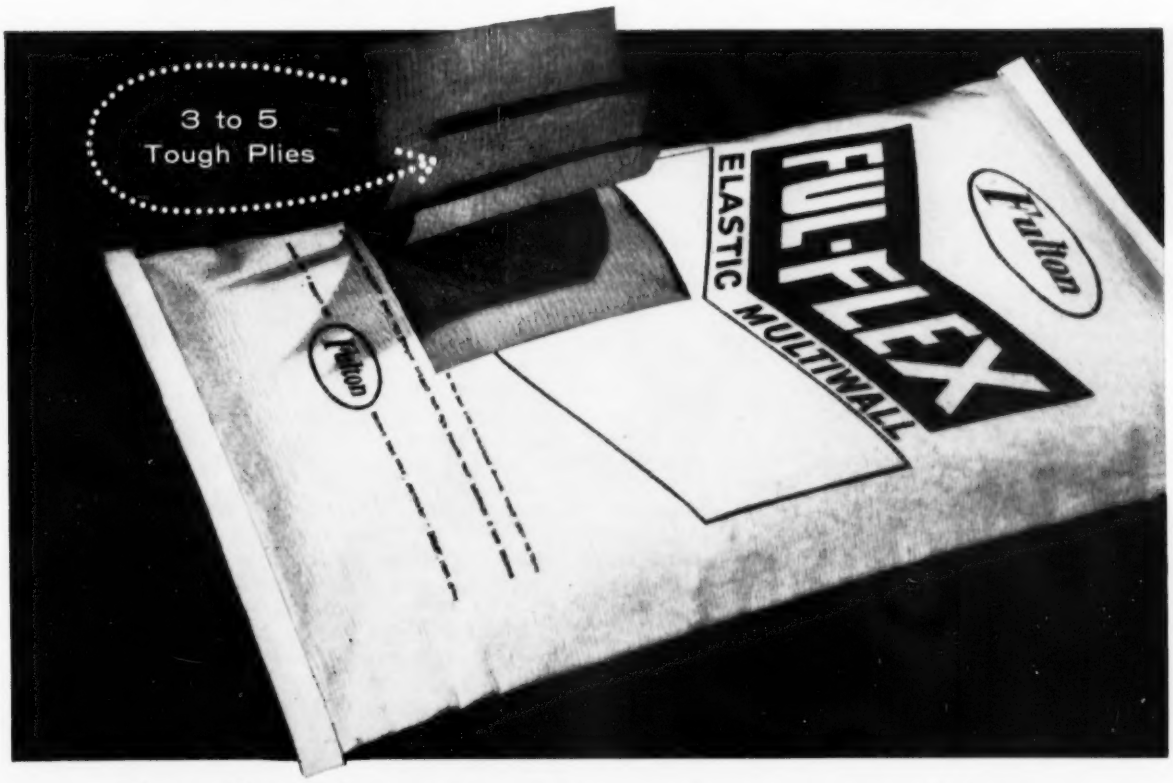
The "wet-process" phosphoric acid is made from phosphate rock and sulfuric acid in the new plant which was designed and constructed by Singmaster and Breyer to use a process licensed from S. A. Metallurgique de Prayon, a Belgian company. The sulfuric acid used in the new plant is "spent" acid from the neighboring plant of National Distillers.

Sodium silicofluoride is also produced in the new plant as a by-product. Purification facilities are being installed, and by April the plant will be producing this material in a grade suitable for domestic water supply fluoridation and industrial uses.

The new phosphoric acid plant is the first in the country to be built with a primary purpose of supplying phosphoric acid to fertilizer manufacturers, according to L. C. Byck, U.S.I. manager of heavy chemical sales. He pointed out that with the trend toward high analysis plant foods, fertilizer manufacturers are turning more and more toward phosphoric acid as a rich source of phosphorous.

Mr. Byck also noted that Tuscola is the only location in the country where these three fertilizer ingredients — ammonia, phosphoric acid, and sulfuric acid—are produced for fertilizer manufacture. U.S.I. operates an ammonia and nitrogen solutions plant here and a sulfuric acid plant as well. Other U.S.I. sulfuric acid plants are located in Dubuque, Iowa and Sunflower, Kansas.

Introducing...Fulton's Ful-Flex Elastic Multiwall Bags



Do the bags you now use have all these 6 advantages?

STRONG . . .
Tough plies of crinkled paper resist tearing.

HANDLES EASY . . .
Ready-to-grip surface means speedier loading.

PLIABLE . . .
Flexibility of bags makes them easy to work with.

SHOCKPROOF . . .
Elastic action reduces breakage from dropping.

DAMP-PROOF . . .
Moisture barrier sheet (if specified) protects products.

SKIDPROOF . . .
Crinkled surface provides grip in stacking bags.

Protect costly chemicals with this tough new package

FOR ALL YOUR BAG NEEDS — LOOK TO FULTON FIRST!

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BAG & COTTON MILLS

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OKLAHOMA CITY • PHOENIX • ST. LOUIS • SAN FRANCISCO
SAVANNAH

Shipments of potash were begun last month from National Potash Company's new mine near Carlsbad, N.M. From left to right are the shipping facilities, the product storage buildings, the refinery and the two head frames, and, in the foreground, the five thickeners. The new facilities took two years to complete and cost approximately $17,500,000. Designed capacity is 400,000 tons of high grade muriate of potash annually. National Potash is owned jointly by Freeport Sulphur Company and Pittsburgh Consolidation Coal Company. Facilities include two 1,850-feet deep shafts—the deepest in the U.S. potash industry—plus a 21-mile water pipeline and product storage buildings having a capacity in excess of 100,000 tons. Mining operations are highly mechanized with much of the machinery specially designed for the purpose.

sales plant at Mt. Vernon, to be managed by **David E. Hasting.**

IOWA

Super-Crop Plant Foods recently held a dinner for 185 dealers at Ottumwa. Chief speaker was **Joe Stritzel,** Iowa State agronomist. **Dave Carpenter,** head of Super-Crop announced 5 new added grades: 20-9-9; 22-10-5; 21-12-4; 22-15-0 and 16-15-0.

KENTUCKY

West Kentucky Liquid Fertilizer Co. has been chartered at Hopkinsville and has begun construction of a liquid fertilizer plant there, which is expected to be in operation by the end of this month. It will have a capacity of 20 hourly tons.

* * *

Ashland Oil & Refining has bought a site at Ashland which is in easy pipeline reach of their refinery and will soon have access to river transport. It is thought the concern will erect there a plant to use Ashland Oil by-products.

LOUISIANA

Baton Rouge is building a $1,500,000 waste conversion plant. **Organic Corp. of America,** Pittsburgh, is contractor.

MARYLAND

Davison Chemical is introducing two lawn and garden fertilizers, Nurish, a water soluble plant food and Wonder-Gro, a granular fertilizer. Nurish is produced on new facilities at their Alliance, Ohio plant; Wonder-Gro comes from their plants at Columbus, Ohio, and Lansing, Mich. These products will be marketed this season on a limited area basis, in mid-West cities. An intensive advertising campaign, with dealer promotional material has been set up. **W. N. Watmough, Jr.,** vice-president in charge of mixed fertilizer division, has organized a special products department to handle home consumer items under the company's Lansing manager, **B. C. Manker.**

MASSACHUSETTS

Sudbury Laboratory, long producers of soil test kits in Sudbury, have come up with a sort of do-it-yourself fertilizer idea. Instead of pre-mixed goods they are marketing a kit of separate 1 pound plastic bags at 39c each. Using the soil test kit, the home gardener determines his soil's needs, buys the ration of NP and K as indicated, and mixes them himself to the formula the soil test shows.

All nutrients are 100% water soluble, and all are highly concentrated.

MICHIGAN

DuPont will build a modern sulphuric acid plant at Encorse on the Detroit River, according to **Clark W. Davis,** general manager of the **Grasselli** chemicals department. It will replace the existing obsolete plant, and will be built on the same site, without interruption to present production. The new unit is expected in production early next year. It is the sixth new unit in the DuPont sulphuric modernization program, begun after World War II.

* * *

Rn'S Fertilizer Co., Akron, are in operation with their liquid fertilizer plant, designed by **J. C. Carlile Corporation,** Denver. The reactor circuit is a Carlile-developed combination ammonium phosphate cooler and aqua ammonia converter, the first in Michigan. This has been patterned after the experience gained by Carlile in their aqua converters installed on the West Coast and Mexico.

The Rn'S plant has a capacity of 20 hourly tons and at peak season is expected to run 10 to 12 hours a day. It is owned by **Harry Rohlfs** and **Stanley Smith. Bill Anderson** is plant manager.

MISSOURI

Missouri Farmer's Association's plant at Joplin is running a series of plant visitation programs. Recently, for example, dealers of the **Consumers Cooperative** and county agents visited, and on the same day a group of high school students were given a tour through the plant. In both cases the operation of the plant was first described, followed by the tour.

* * *

Semo Liquid Fertilizers are another outfit that believes in the open house technique. Manager **John Wilson** recently extended an invitation to all farmers in southeast Missouri, and during a two-day period gave them "the full story" on liquid fertilizers, with demonstrations adiacent to the plant.

MISSISSIPPI

Coastal Chemical recently broke ground for its $6,000,000 plant at Pascagoula. Affiliated with the **Mississippi Chemical** plant at Yazoo City, and with the same president—**C. S. Whittington**—and the same executive vice president, **Owen Cooper**—the plant when built will include a 75 daily ton phosphoric acid unit and a granulated nitrate fertilizer plant with 300 daily ton capacity.

* * *

American Potash & Chemical have announced plans for a $5,000,000 plant at Aberdeen, with completion scheduled for mid-1958. Initial production will be 15,000 annual tons of sodium chlorate, for herbicides, defoliants and as a bleaching agent in the paper industry.

* * *

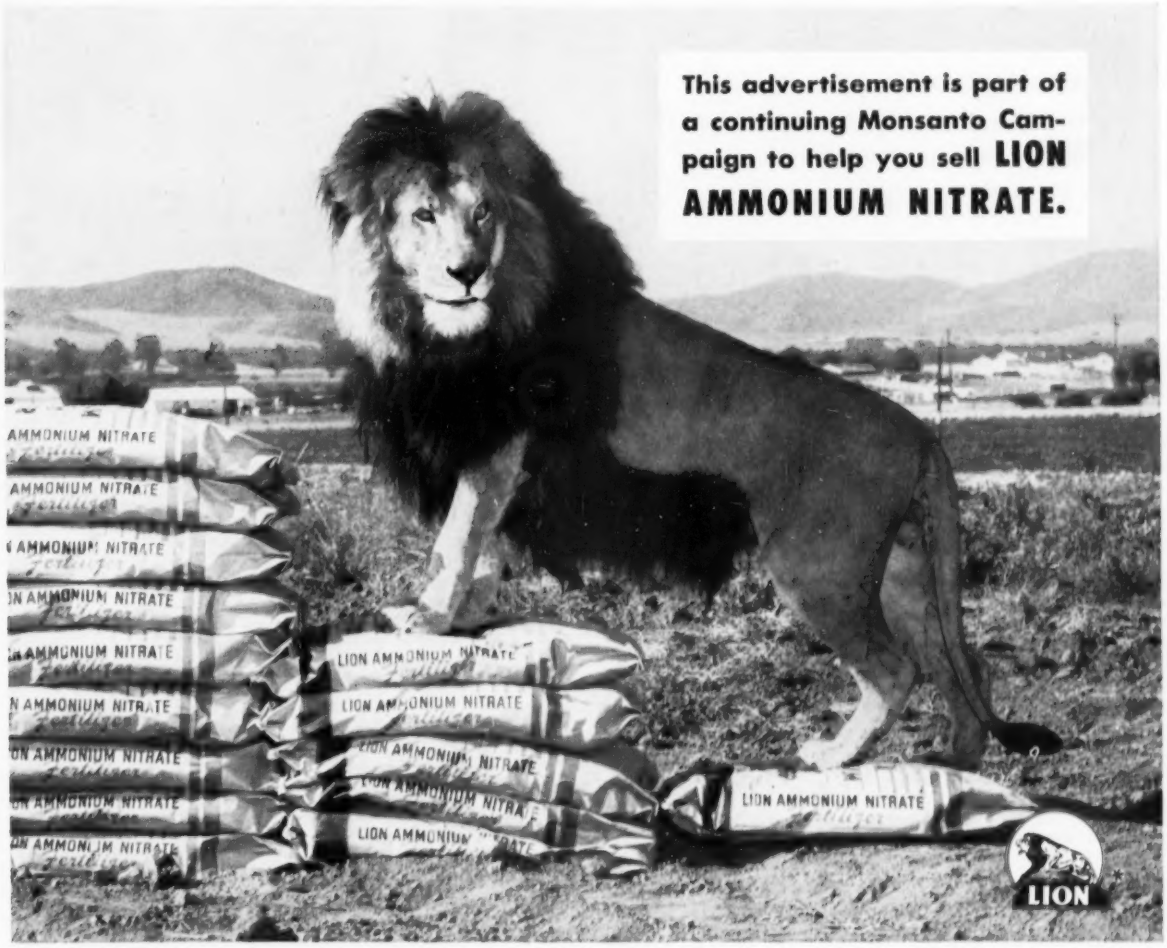
Hayes-Sammons Chemical, Mission, Texas, are completing a new crop chemical plant near Indianola, to be known as the Delta Division. Their sales manager for the past five years, entomologist **Andy N. White,** has been transferred to Indianola as general manager of the division. **Arthur E. Smith, Jr.,** has been transferred as production superintendent. He was assistant superintendent at Mission. **Thomas B. Sammons, Jr.,** is president of the concern.

OHIO

Nitrogen Division's plant at South Point suffered a fire which produced fumes that frightened people in the vicinity. The company personnel, however, worked their usual shift. 45,000 tons of fertilizer material were in the warehouse where the fire occurred.

PENNSYLVANIA

General Chemical division of **Allied Chemical & Dye** has put into action its new nitric acid unit, which



*Trade-mark of Monsanto Chemical Company

You save money with LION in your fields

LION BRAND AMMONIUM NITRATE IS MORE ECONOMICAL THAN NITRATE OF SODA OR AMMONIUM NITRATE–LIMESTONE CARRIERS

FOR LOW-COST NITROGEN, LION Ammonium Nitrate is the brand. Guaranteed to contain 33.5% nitrogen, LION is...

- **Far more economical** than nitrate of soda, which contains only 16% nitrogen. You get more than *twice as much* of the valuable plant food, nitrogen, in every bag of LION brand Ammonium Nitrate than you do in any bag of nitrate of soda.
- **A better buy** than 20.5% ammonium nitrate–limestone carriers, LION gives you *better than* 50% more nitrogen in every bag.

FOR EASIER SPREADING, Lion Ammonium Nitrate is in pellet form. These pellets are specially coated to withstand caking ... then packed in specially lined, moisture-resistant bags. Result: LION brand is *guaranteed* to flow freely—*not for just a year, but until used*—when you follow storage directions on the bag.

3 EASY STEPS TO GET *ALL* THE FEEDING-POWER YOUR CROPS NEED

1. TEST YOUR SOIL to see what kinds and amounts of fertilizers are needed. Your local farm authorities will help.

2. ORDER WHAT YOU NEED of mixed fertilizer and Lion brand Ammonium Nitrate from your fertilizer dealer. When you buy LION, you get top-quality, low-cost nitrogen fertilizer *guaranteed* to flow freely; *guaranteed* to contain 33.5% nitrogen.

3. APPLY THE FULL AMOUNT of mixed fertilizer and Lion brand Ammonium Nitrate soil tests indicate. Don't skimp—fertilizer is the least expensive item you use for crop production.

GROW MORE PROFITABLY... Weed Killers • Brush Killers • Parathion Insecticides • Meta-Green® to keep silage fresh • Phosphates (liquid and solid) • LION Sulphate of Ammonia • Anhydrous Ammonia.

MONSANTO

MONSANTO CHEMICAL COMPANY • Inorganic Chemicals Division • St. Louis 1, Mo.

The National Plant Food Institute staff cooperated with USDA in the planning of this colorful and practical exhibit illustrating the value of soil testing in determining the proper fertilizer application on the farm. The booth is available, on loan, from the USDA's Exhibits Service, on a basis whereby the borrowers are asked to absorb the cost of transportation and also provide space, handling and any necessary local drayage. Initial inquiries should indicate the dates and locations of occasions for which the exhibit is intended.

doubles the capacity of the plant at Newell.

SOUTH DAKOTA

Crest Chemical, Watertown, has put into operations its new plant which turns out high analysis mixed fertilizers utilizing the Weatherly Controlled Granulation process. The plant was designed by the **D. M. Weatherly Company,** Atlanta.

TEXAS

Texas Gulf Sulphur has announced plans to spend $10,000,000 building a sulphur plant three miles off Galveston Island. A total of $5,000,000 will be spent in addition for facilities to transport and store sulphur produced at the new dome and from their three other Texas sulphur recovery plants.

* * *

City of Houston will spend $750,000 to enlarge its sewage treatment plant by 50%.

* * *

Ferd Staffel Co., San Antonio has announced a lawn and garden fertilizer (8-12-4) "especially designed to neutralize the alkalinity of the local soil."

UTAH

U. S. Steel's Nitrogen Products division has launched its marketing program to distribute the products of the Geneva Works, at Provo. (See Idaho)

VIRGINIA

Nitrogen Division has begun production of pebbled ammonium nitrate fertilizer at its new facilities, Hopewell. The new facilities were designed by the Division's development department, and built by **Tidewater Construction Co.,** Norfolk.

American Oil will get under way this summer with its new 50 daily ton sulphur recovery unit at Yorktown. **Fluor Corporation** will handle the engineering.

WASHINGTON

Phillips Pacific is well along with its $15,000,000 Coulee Chemical plant at Finley and will be in production early this year. Anhydrous ammonia equipment is now being installed with **Hydrocarbon Construction Co.,** Houston, in overall charge of construction. 200 daily tons of fertilizer will be produced. The plant, begun a year ago, is the joint project of **Phillips Petroleum** and **Pacific Northwest Pipeline.**

* * *

Northwest Refining and Chemical, has fired up the reverbatory furnace of its new $260,000 Spokane Valley plant, and is in production on ammoniated zinc sulphate fertilizer, with 15 daily tons production. Nine carloads are on order from the Columbia Basin. **Lloyd C. Cunningham** is board chairman; **Arthur Anderson,** president; **Jack P. Masseli,** vice-president; **Reo Tinn,** treasurer; **John A. Allen,** secretary; **Barnard Wilcox,** who has headed the operation during the construction stages, is in charge of production and research.

* * *

Farm Chemicals Inc., Athena, is completing a $60,000 plant for fertilizer and crop chemicals in Athena with **C. E. Hesp** as the local manager.

WEST VIRGINIA

DuPont's Belle Works plans expansion of facilities for "Uramon" ammonia liquors, to be completed in 1959, according to sales manager **F. M. Jornlin.** The Belle Works was established in 1926.

BRAZIL

Krebs et Cie, Paris, will supervise construction of the plant at Bahia being set up by US and Swiss interests, which will utilize some $10,000,000 of imported equipment, plus the structure whose cost has not been disclosed, except that the Brazilian portion is $4,500,000.

CANADA

British-American's $5,000,000 gas-treating and sulphur plant, Lethbridge, Alta., now in operation, has brought to $25,000,000 the investment to date to capitalize the estimated $600,000,000 worth of natural gas and valuable by-products in the Pincher Creek area. Many more millions of expenditure are anticipated and planned.

* * *

American Cyanamid's subsidiary, **North American Cyanamid, Ltd.** plans to spend amounts, variously reported between $15,000,000 and $20,000,000 near Hamilton, Ont., to produce anhydrous ammonia and urea. **Frank S. Washburn,** president, made the announcement. **Dominion Foundries & Steel, Ltd.,** is association with Cyanamid in this project.

* * *

Quebec Ammonia which recently purchased a 90-acre site near Brockville, Ont., plans to build there a $9,000,000 plant.

* * *

Potash Co. of America has spent $10,000,000 and expects to make it $20,000,000 on the Saskatoon, Sask., development. Production is due to start in 1959. The shaft, now down 1200 feet, has to go to 3000 feet. Concentrator plant construction is scheduled for June.

CHILE

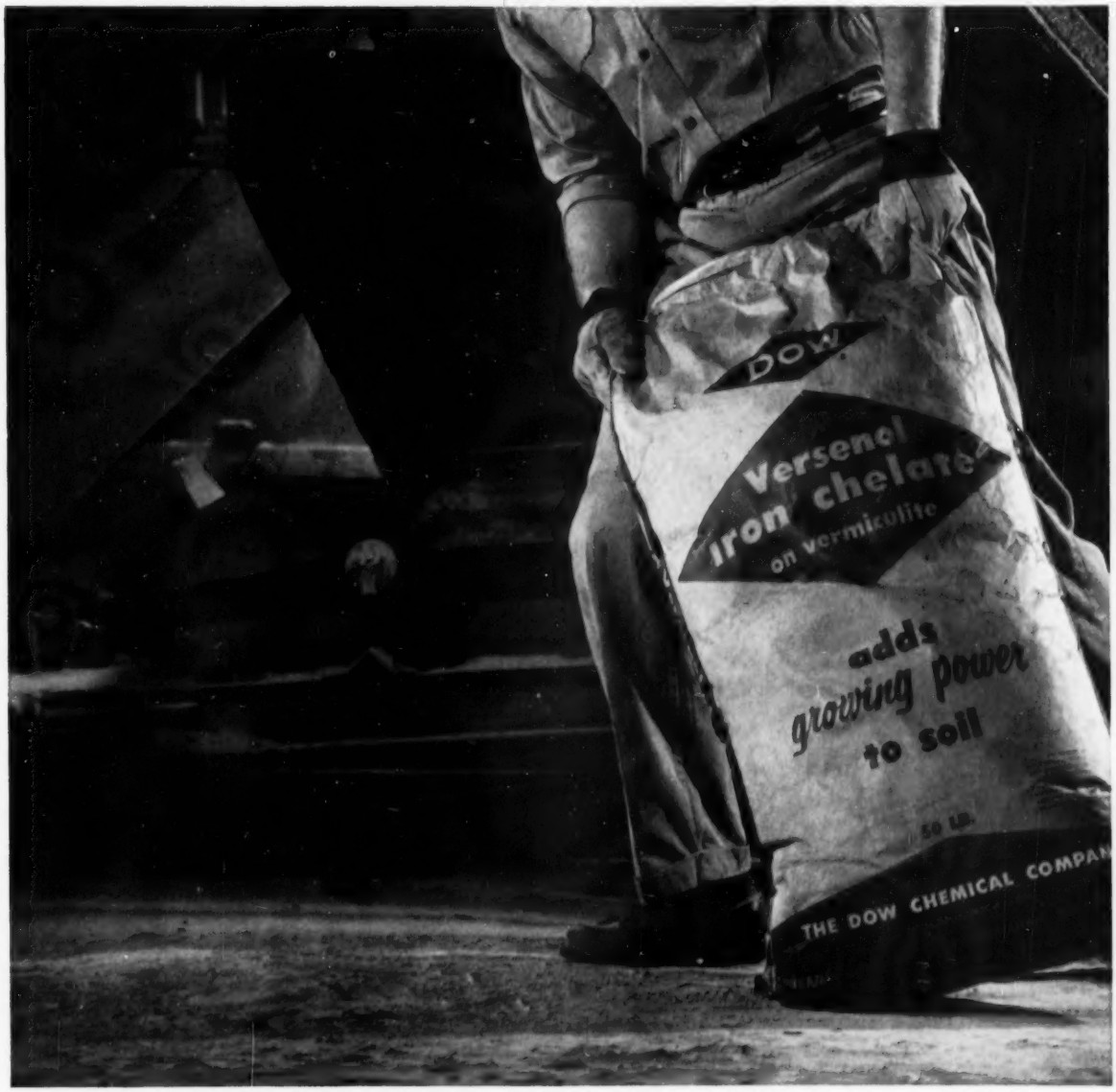
Kennecott Copper's subsidiary, **Braden Copper,** plans to expand its sulphuric acid production to 75 daily metric tons by the construction of a $3,300,000 plant near their El Teniete mine.

ENGLAND

Fisons Ltd, London, in addition to the big plant at Mucking, adjacent to Shell's new plant there, will step up the triple superphosphate capacity at Immingham. Their big new research laboratory has just been opened. They have just completed reconstruction of their general fertilizer plant at Plymouth.

ITALY

Montecatini is studying plans to build a chemical plant in the US,



Iron-clad protection for repeat fertilizer sales

with VERSENOL IRON CHELATE

The best way to be sure iron deficiencies of soil won't keep your formulations from performing at their best is to include VERSENOL® IRON CHELATE . . . your iron-clad protection for repeat sales.

Just small amounts of VERSENOL IRON CHELATE, an organic form of iron, correct deficiency in either acid or alkaline soils. It's a more effective, longer lasting method of supplying iron than the inorganic sulfates. Whether your customers are citrus growers, truck gardeners, nurserymen, greenhouses, landscapers or home gardeners, they'll be quick to notice the difference VERSENOL IRON CHELATE makes. Plants turn and stay a healthy, rich green. Growth is improved. Bloom is enhanced. And the other elements in your fertilizers work to best advantage . . . and to your credit.

Dow makes two formulations: VERSENOL IRON CHELATE and VERSENOL IRON CHELATE on Vermiculite. The Vermiculite formulation is easy to mix with dry fertilizers and actually flow-conditions your regular fertilizer for easier application. The concentrate can be mixed into liquid formulas. For further information, write directly to: THE DOW CHEMICAL COMPANY, Agricultural Chemical Sales Dept., Midland, Michigan.

WEED AND BRUSH KILLERS, SOIL FUMIGANTS, GRAIN FUMIGANTS, INSECTICIDES, FEED ADDITIVES, ANHYDROUS AMMONIA, DEFOLIANTS.

Dow presents
THE RED FOLEY SHOW
every Saturday. See radio listing for time and station.

YOU CAN DEPEND ON DOW

SULPHUR

helps to create headline products

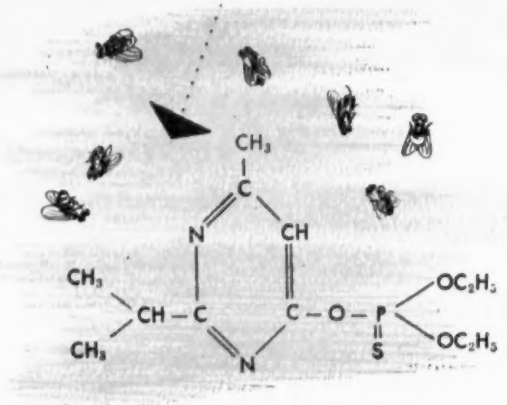
DIAZINON*

What a 'killer' this complex chemical is turning out to be! And quite impartial as to its victims: — houseflies, barnflies, fruitflies, aphids, mites, ants, beetles, chinch bugs, roaches, and many other pests that bother man and beast. It kills them dead!

As with the former chemicals which made such notable headway in man's fight to subdue these destructive pests, Sulphur is very much in the picture—here is one of the many variations of the benzene ring . . . the Diazinon Formula. That letter "S" tied in with the letter "P" discloses the all-important thiophosphate.

Sulphur, often called one of the Four Pillars of the Processing Industry, is benefiting mankind in many ways. None is more important than that of controlling crop-destroying pests.

**A product of the Geigy Chemical Corporation.*



Texas Gulf Sulphur Co.

75 East 45th Street, New York 17, N. Y.
811 Rusk Avenue, Houston 2, Texas

Sulphur Producing Units
- Newgulf, Texas
- Moss Bluff, Texas
- Spindletop, Texas
- Worland, Wyoming

according to president **Dr. Carlo Faina.** No decision as to site has been made, but several are under study. Montecatini is a big factor in fertilizer material production in its own right, and has had a part in the development and construction of many millions of dollars worth of plants for other owners in several parts of the world. Their plant at Ferrari, into which has gone most of the $28,000,000 they invested in 1956, will soon be in production.

ISRAEL

Phosphate Mining (a government concern), Tel Aviv, is planning expansion of equipment, which will permit the output to reach 250,000 tons by 1958, which in turn is expected to put the operation into the black. It is currently working at a deficit. West German equipment is already on order. This year Israel expects to export some 100,000 tons of rock phosphate. This much will be available after domestic needs are satisfied.

KOREA

The Economic Board is studying a total of 45 bids made for the $28,500,000 worth of fertilizers to be bought with US aid. Included among the bidders are concerns in the US, Canada, West Germany, Belgium and Japan. Japan has a freight cost edge . . . $4 to $10 a ton as compared to an average around $35 for shipment from the other countries involved.

MEXICO

Texas Gulf Sulphur's affiliate, **Compania Exploradora del Istmo,** has begun production in its Veracruz plant.

NORWAY

Norwegian Zinc will have in production by the time this appears in print their unusual double super phosphate fertilizer plant at Odda. Continuous operation of this plant requires only three men per shift.

PAKISTAN

The Industrial Development Corporation has submitted to the Government two proposals for fertilizer plants: Multan, 200,000 annual tons, based on Sui Gas; Sylhet, where natural gas has recently been discovered, capacity of 100,000 annual tons.

PUERTO RICO

Gonzales Chemical Industries is completing test runs on its newly completed $12,300,000 ammonium sulfate plant at Guaica. In full production, the plant can turn out 120,000 annual tons of ammonium sulfate; 115,000 annual tons of sulphuric.

RHODESIA

African Explosives and Chemical will put $140,000 into a pilot plant as a start toward development of the Dorowa phosphate deposits, recently discovered, which are estimated to contain some 20,000,000 tons of phosphate rock, out of which they hope to get some 4,000,000 tons of concentrate.

SOUTH AFRICA

Fisons Ltd.'s affiliate, **Fisons PTY,** will build in Sasolburg a 200,000 annual ton superphosphate plant, adjoining Sasol's unit which produces oil from coal. The plant is to cost $5,600,000.

TURKEY

Nitrogen Industries Ltd. will build a $43,000,000 plant at Kutahya with capacity for 60,000 annual metric tons of ammonium sulphate; 50,000 of nitrate; 6000 of concentrated nitric acid; 1000 of crystallized ammonium nitrate; 1000 of liquid ammonia. Contractor: **Badische Analin und Soda Fabrik,** Germany.

CHANGES

Smith-Douglass becomes sole stockholder in **Texas City Chemicals,** now that their reorganization plan has been confirmed by the US District Court for the Southern District of Texas. The plant will produce sulphuric acid, phosphoric acid, dicalcium phosphate in both feed and fertilizer grades, high analysis pelleted fertilizers manufactured on the monoammonium phosphate principle, liquid base fertilizer solutions, and other fertilizer and chemical products.

KENNEDY

Davidson-Kennedy Company, 69 year old Atlanta, Ga., concern has announced an affiliate, **Davidson-Kennedy Associates,** which will operate independently, but will complement the manufacturing facilities of the parent company. **Thornton Kennedy** is president of both concerns. Offices will be in Atlanta and at 2623 Chicago Road, Chicago Heights, Ill.

Engineering, plant design and construction will be supplied by the Associates equipment on a bid basis by the parent company.

Heading up the Chicago office are **James Iliff** and **Rex Wingard,** both from major posts with **Blaw-Knox.**

With this organization, said Mr. Kennedy "We enter our 70th year able to offer complete turnkey service to chemical processors.

* * *

National Distillers, if stockholders approve, will change its name to **National Distillers and Chemical Corporation,** which will acknowledge its progress in the industrial chemicals field, such as its **Petro-Chemicals Corp. John A. Bierworth,** president, announced the plan, which will be presented to the stockholders April 17.

Effective March 1, the Nichols Seed Co. and Nichols Fertilizer and Chemical Co. of Oklahoma City have merged to form the Nichols Seed and Fertilizer Co. Announcement of the merger was made by Earl Nichols, left, former president of the fertilizer and chemical company, who is president of the combined organization. John I. Taylor, the former president of the Oklahoma Farm Bureau, was named general manager of the merged companies. This is another step forward for the Nichols organization which began in 1931 as a retail store and now operates four plants in Oklahoma with 1,500 dealers in Oklahoma and surrounding states.

Bellows Company, Akron and **Richardson Scale,** Clifton, N. J., have formed **Richardson-Bellows, S.A.** at Geneva, Switzerland, to make and market the products of the two concerns. The new organization was formed out of the headquarters Richardson has maintained in Geneva since 1952.

The new organization will also supply engineering service in connection with the distribution abroad of Bellows air handling equipment and Richardson materials handling equipment.

Money

(Continued from page 39)

In review, I have attempted to point out—

1. That while the demand for money today is in excess of supply, agriculture—even using its broadest definition—has been little inconvenienced or hampered by the present shortage.

2. Money is available to farmers from many sources—from both public and private institutions.

3. That banks—both public and private—generally make production loans based on carefully developed budgets in which are included all items for out-of-pocket costs.

Money, Management and Marketing are today the three big M's of agriculture, and the least of these is not the proper use of money.

Personals

Dr. Arthur M. Smith, assistant to the vice president, who will be responsible for the direction of the anhydrous ammonia program of the Plant Food Division, Olin Mathieson Chemical Corporation, it has been announced by S. L. Nevins, vice president. His headquarters will be in Little Rock, Ark. Dr. Smith joined Olin Mathieson in 1948.

James G. Gibbs, formerly vice president of **Etiwan Fertilizer Co.** and **Shipyard River Terminal Co.,** Charleston, S. C., has been elected president of the companies, succeeding the late **W. R. Sullivan** of Atlanta, who died in August.

* * *

John Hay Whitney has resigned as chairman of the board of **Freeport Sulphur Company** and **Langbourne M. Williams,** president of Freeport, has been elected chairman to succeed him.

Mr. Whitney resigned as chairman and as a director immediately after Senate confirmation of his nomination as **Ambassador to the Court of St. James's** in London.

* * *

A. N. Wohlwend, director of commercial development of **Escambia Chemical Corporation,** was appointed vice president by the board of directors at the meeting held on February 26, it was announced by **R. U. Haslanger,** president. Mr. Wohlwend joined Escambia last year.

Erhart K. Drechsel has joined Escambia, it was announced by Mr. Wohlwend. He will be located at company headquarters, 261 Madison Avenue, New York City, and will devote full time to commercial development activities.

Mr. Drechsel joins Escambia Chemical from **American Cyanamid.**

* * *

General American Transportation Corporation has announced the election of **A. E. Douglass** to its board of directors.

Mr. Douglass is chairman of the board of **Fuller Company,** Catasauqua, Pennsylvania, a wholly owned subsidiary of General American.

* * *

Russell E. Spivey, former manager of the **Smith-Rowland Co.,** and recently serving in a sales capacity for the **Smith-Douglass Co.,** has been named manager of wholesale sales and raw materials procurement, vice president **J. A. Monroe,** who heads the Smith-Douglass procurement and wholesale division, has announced.

* * *

The board of directors of the **Magee Cooperative** (A.A.L.), Magee, Miss., have employed **M. R. Calder** as manager to fill the vacancy left by the death of **B. A. Smith.** Mr. Calder came with this organization in November 1950, as field representative and purchasing agent.

* * *

A chemical engineer and an organic chemist have joined the staff of the research and process development department of **The American Agricultural Chemical Company.**

They are: **James A. Taylor,** 50, formerly head of the department of chemical and metallurgical engineering at **Wayne University,** Detroit, who has been named research chemical engineer. **Bernard Buchner,** 35, formerly senior organic chemist for the **Koppers Company** in Pittsburgh, has been named research organic chemist.

* * *

The appointment of **Dwight Worsham** to the position of foreign sales representative, foreign department, has been announced by **M. E. Wierenga,** manager, foreign department of **Calspray.**

Before his appointment, Worsham had been with Calspray for three

Commercial Solvents has named W. Ward Jackson vice president sales, Graham W. McMillan and J. F. Dudley as vice presidents, research and production and engineering, respectively; James V. O'Leary as general sales manager. Not shown is Harold F. McGuire who has been elected to the board of directors.

Fulton Bag & Cotton Mills announces the appointment of Jack C. Baldwin, as Western director-national accounts, bag division. The announcement was made from Fulton's bag division general office in New Orleans, La. by Jason M. Elsas, vice president and general manager. Mr. Baldwin will headquarter in Los Angeles.

Sinclair Chemicals, Inc. has announced the appointment of Earl Noblet as assistant manager of market development. Mr. Noblet joined Sinclair in 1954 after five years' experience in research and development of organic intermediates and nitrogen chemicals.

The appointment of Earl Straub as sales representative for the Grand River Chemical division of Deere and Company in Missouri and surrounding area has been announced by John R. Taylor, Jr., sales manager.

years as a Sales Representative in the San Joaquin Valley.

Promotion of R. H. Ayers, left, to the position of sales manager of the paper bag division of Chase Bag Company, and of Roy H. Ploeger to manager of the Toledo Sales division, has been announced by W. N. Brock, vice president and general sales manager.

Jack F. Dulaney is sales supervisor in charge of the branch sales office opened by **Nitrogen Division, Allied Chemical & Dye,** April 1 at Memphis, Tenn. The new office is located at Southgate Office Plaza, 1929 South 3d St., and services Tennessee, Louisiana, Mississippi, Arkansas, Oklahoma, Texas and New Mexico.

Homer Dudley has been named sales supervisor for direct application materials in the Omaha district, which comprises Nebraska, Iowa, Kansas, Colorado, Wyoming and Montana.

* * *

Byron M. Kern has been made general manager of production, agricultural chemicals division, **Spencer Chemical.** He will direct the manufacture of Spencer's agricultural chemical products produced at Jayhawk, Henderson and Vicksburg works.

James E. Iliff who has been announced as vice president and general manager of the new Davidson-Kennedy Associates Company (See Changes) by president A. T. Kennedy. At Blaw-Knox he pioneered that company's entrance into the design and construction of fertilizer plants. He joined Davidson-Kennedy in January.

Thomas A. Bruns has been appointed area sales manager for the Phosphate Minerals division of International Minerals and Chemical Corporation, according to S. T. Keel, division sales manager. He will be responsible for sales of phosphate rock for agricultural and industrial uses in northern United States and eastern Canada. Mr. Bruns joined IMC 10 years ago.

Marsh Diaphragm For Field Assembly

A new aluminum diaphragm assembly designed particularly for use with nitrogen solutions, and any other pressure medium not injurious to aluminum, has been developed by the Jas. P. Marsh Corporation of Skokie, Illinois.

This new unit is designed for field assembly and may be used with any reliable fluid-filled pressure gauge. Suitable for applications using up to 200 lbs. pressure.

Omega Offers Hi-Weigh Bulletin

Advanced-design features of the new Hi-Weigh Model 37-20, belt type gravimetric feeder developed to meet modern industry's need for an accurate, durable, medium to high capacity dry material feeder are described in a colored, four-page bulletin just issued by Omega Machine Co., a division of B-I-F Industries, Inc., Providence, R. I. Write for your free copy of Bulletin 35-N62, to Omega Machine Co., 345 Harris Ave., Providence, R. I.

OBITUARIES

Willard H. Allen, 64, New Jersey Secretary of Agriculture under six governors. He retired just last February.

Harold Davis Skyrm, 59, vice-president and a director of General American Transportation Corp., February 24, following a heart attack.

Barron A. Smith, organizer and manager since 1934 of Magee Cooperative, AAL, Magee, Miss., March 2, after an illness dating back to December 1956.

IRRIGATION

IN RELATION TO NITROGEN FERTILIZATION

IN COTTON PRODUCTION

by JOHN R. STOCKTON, *Irrigation Specialist*
University of California, U. S. Cotton Field Station
Shafter, California

Cotton production in the arid regions requires copious applications of water and nitrogen for good production. The interaction of these factors of production is extremely interesting and of vital concern to the cotton grower. The artificial application of water and nitrogen (particularly the chemical forms) have resulted in a myriad of problems affecting all aspects of cotton production. The proper placement, timing and amount of both water and nitrogen is very important.

The primary factors involved in plant growth are soil and climate and as far as the cotton plant is concerned; certain aspects of these factors of soil and climate can affect the vegetative portion of the plant differently than the fruiting portion of the plant. Where vegetative growth is under study the factors affecting it are much easier to study and evaluate, but when we are interested in the fruiting aspect of growth, as we are in cotton production, the factors involved are more complex and interdependent. To improve our understanding of these factors of soil and climate we are going to need facilities where control over the plant environment can be exercised.

The effect of soil moisture on plant growth has been studied for many years under diverse climatic and soil conditions. Many irrigations have been compared with few; light irrigations have been compared with heavy; flooding has been compared with furrow irrigation; sprinkler irrigation has been compared with surface methods; studies have been made in containers, of varying size, in greenhouses and out of doors. The conclusions that have been drawn from these studies are almost as numerous and varied as the number and type of studies. In spite of this apparent complexity of information and recommendations, all of these studies can be reconciled by a careful evaluation of the fundamental principles of soil moisture and the physiology of the growth and development of the cotton plant.

Soil moisture content of soils is commonly expressed in grams of water per 100 grams of dry soil. To express this as the volume of water per increment of soil depth the ratio of the bulk density of the soil to the density of water must be taken into consideration. On this basis, a soil moisture content of 12.8% or 12.8 gms. per 100 gms. of soil is equivalent to 2 inches in one foot of soil. However, not all of this moisture can be used by plants. Plant roots can dry out a soil to a certain definite level, the wilting point, which is characterized by the force with which the water is held by the soil particles. At this lower limit of moisture availability, this force is equivalent to a "negative pressure" or tension of 225 pounds per square inch. The moisture content at this lower level of availability can vary from 3% to 20% depending on the texture of the soil.

The soil that we were discussing, that could hold 2 inches of water per foot of soil, when at the wilting point would hold about 6.9% or 6.9 grams per 100 grams of soil which is equivalent to 1.1 inch of water per one foot of soil. Therefore, only 0.9 inch of water per foot of soil is actually available for use by the plant. The tension with which this 0.9 inch of moisture is held by the soil particles varies from about 5 pounds per square inch at field capacity up to 225 pounds per square inch at the wilting point. This change in the force with which the moisture is held is a continuous function of moisture content but the rate of increase of this force becomes extremely great as the moisture content drops to near the wilting point.

Only when the entire soil volume is thoroughly permeated with roots can the soil moisture content be uniformly reduced to a particular level. Under most field conditions there is a rather sharp gradient in moisture content from the soil surface to a considerable depth. So we see that plant growth in relation to soil moisture is dependent on not only the moisture content but to the force with which the water is held to the soil particles and to the extent that the root system is subjected to any particular moisture level. The development of the root system varies with the age of the plant and soil conditions.

To demonstrate how these principles of soil moisture are related to irrigation frequency we will compare two soils bearing a cotton crop that will require approximately 24 inches of water throughout the season. The two soils, a sandy loam and clay soil, due to their respective moisture holding capacity and root development, can only store 1.9 inches and 4.0 inches in the root zone. This will mean that the sandy loam will require 12 irrigations and the clay only 6 irrigations. Irrigation frequency studies are in good agreement on the effect of moisture levels so low that the plants are allowed to wilt prior to each irrigation. Variations in irrigation frequency above those that result in frequent wilting have resulted in varying conclusions as to the effect of soil moisture in relation to yield of seed cotton. The reasons for this are many and complex.

The response of the cotton plant to nitrogen fertilization has also been studied rather thoroughly under varied conditions of soils and climate. The utilization of nitrogen is somewhat analogous to the utilization of water by the cotton plant. The nitrogen requirement for a cotton crop is approximately 100 to 150 pounds and the period of peak use is about the same as for water. The nitrogen "storage capacity" of the soil is variable, depending upon texture, organic matter content and

Presented at Western Cotton Production Conference, Phoenix, March 4-5.

water movement through the soil profile.

In arid regions organic matter is a minor source of nitrogen and for optimum yields almost the entire nitrogen requirement must be added to the soil. This is generally added to the soil in one or two applications of sufficient quantity to supply the needed amount of nitrogen for the entire season. The nitrogen fertilization program must be designed to fit the particular soil and climatic conditions. Irrigation efficiency and nitrogen fertilization efficiency are also quite analogous. The problem, in both cases, is to make available to the growing plant sufficient water and nitrogen for optimum production with the greatest efficiency. This efficiency is the ratio of the applied material to the amount utilized by plant whether it is water or nitrogen. 50-70% efficiency is fairly typical for irrigation and 25-60% for nitrogen fertilization.

Recent studies of nitrate levels in leaf petioles of the cotton plant under varying irrigation levels have shown that the uptake of nitrogen is markedly influenced by irrigation. This may be partly attributed to leaching and/or possibly to differential nitrogen requirements under differential irrigation levels. Whatever the explanation it does indicate an intimate relationship between irrigation and nitrogen fertilization.

Field studies where both nitrogen fertilization and irrigation frequency are involved in combination have not been too numerous or the results too conclusive. The response to either factor, water or nitrogen, has been found to be influenced by variations in the alternate factor. The yield increase from successive increments of nitrogen has in general been found to be greater as the frequency of irrigation is increased. This is particularly so where vegetative portion of the plant is considered.

This past year, two such tests were conducted in the San Joaquin Valley of California. The response, in yield of seed cotton, to either factor was the same regardless of the level of the other factor. For vegetative growth the response of each factor increased at increased levels of the other factor. In both of these tests fairly rank growth was obtained by the combination of frequent irrigation and the high rate of nitrogen (5-5½ feet). From these studies and others in California yield is fairly well correlated with plant height up to about 4 feet. Plants taller than this will vary considerably in their yielding ability. In these tests, mentioned above, the intermediate and infrequent irrigation treatments were irrigated according to visual symptoms of moisture deficit. The dry, infrequent treatment was not irrigated until the plants were definitely wilted and the subsequent irrigation was heavy enough to completely re-wet the soil profile.

The intermediate treatment was irrigated at the first signs of moisture deficit which was indicated by an apparent change in the color of the foliage and was usually accompanied by transient wilting just prior to the irrigation. The wet treatment was irrigated frequently enough to prevent the appearance of any signs of moisture stress. In one of these tests on a silty clay soil, the frequently irrigated treatment (five irrigations) produced the largest plants, but actually reduced the yield of seed cotton in compari-

son to the less frequently irrigated treatments. The other test, on a sandy loam soil, the yield increased as the frequency of irrigation was increased although the greatest increase was obtained by the intermediate frequency with a much smaller increase for the next level of irrigation.

Similar tests have been conducted in the Coachella and Imperial Valleys of California and near Yuma, Arizona in recent years; and in the African Sudan in 1928.

It is interesting to compare these tests conducted under such diverse soil and climatic conditions. The test conducted in the African Sudan in 1928 consisted of three rates of nitrogen and three levels of irrigation on a dense clay soil. The variety of cotton was Sakelaridis, a long staple Egyptian with limited root development and a maximum plant height of about 3 feet in high levels of nitrogen and irrigation combination.

The irrigation treatments were unique in that the number of days between irrigations was the same and varying amounts of water applied according to the level of irrigation. The irrigation treatments designated as Light, Medium and Heavy received the equivalent of 2, 3.5 and 5 inches of water per application. In this area the plants probably used about 3.5 inches of water between irrigations. On this basis, only the wet treatment, where 5 inches of water was applied, would begin to replace the water loss for the two week period. The Light and Medium irrigation treatments after about midseason would be subjected to serious water deficits prior to each irrigation. Under these conditions a good response to increasing levels of irrigation was obtained for both yield and vegetative growth and a good correlation between plant height and yield was observed. This correlation is to be expected since the irrigation treatments were so designed as to seriously limit plant growth and rank growth was not obtained with any combination of nitrogen and water.

The test conducted near Yuma, Arizona in 1952 on an infertile, well drained, extremely sandy soil involved three levels of irrigation, three levels of nitrogen fertilization and three plant populations. The extreme transpiration conditions, the low water holding capacity of the soil and the long season of boll production made it necesary to apply 41 irrigations to the wet treatment in order to maintain the available moisture at a high level, at a depth of eight inches throughout the season. The response in yield of seed cotton was significantly affected by both nitrogen and water and the response to each factor was much greater at the high levels of the other factor.

This interaction was apparently not significant in terms of vegetative growth and increased irrigation frequency resulted in no increase in vegetative growth or flowering. Growth was measured frequently until January and boll production approximately weekly until November. These data show that the period of boll production is about 1½ months longer than it is in the San Joaquin Valley.

In this test, bolls set up until October 10 matured and in the San Joaquin Valley very few bolls set after August 15 will reach maturity. Considering the accumulated boll set curves from this study for the three irrigation treatments up until August 15 there is very little difference in the number of bolls particularly between the wet and intermediate treatments. The increased boll production for the wet treatment was obtained after mid-August. The differences in vegetative growth due to irrigation were appreciably early in the season, but were obliterated by rapid growth for the dry treatment after mid-September.

An evaluation of the factors related to cotton production under these diverse soil and climatic conditions emphasize the inherent dangers in making any general conclusions regarding the growth and productivity of the cotton plant. The cotton plant is indeterminate in growth and is capable of extended period of growth and fruiting where conditions of environment permit. This factor alone makes it unwise to say what management practice is best for optimum production in all situations. In the San Joaquin Valley of California, in most years, it is imperative to get a good set of bottom bolls for good production since a killing frost can be expected by the middle of November. Climatic conditions such as temperature and sunlight are also generally below optimum for good growth after the first of November.

It is quite apparent that the length of the season, plant diseases, insect activity can all be important factors in altering the response obtained from irrigation and nitrogen fertilization studies. In addition, responses to irrigation and nitrogen fertilization studies under field conditions can be strongly influenced by the methods used, root development and inherent fertility of the soil. In making interpretations of studies of this type, the degree and extent of soil moisture and nitrogen deficits as indicated by the plant must be carefully observed and recorded.

In conclusion, it appears that studies involving varying irrigation and nitrogen levels are influenced greatly by soil structure, soil depth and the accompanying root development. Where these soil conditions are optimum for root development, over-fertilization and very frequent irrigations can result in extreme vegetative growth at the expense of good production of seed cotton.

Bagging Machine Suit Resolved by Court

Kraft Bag Corp. has released the following information:

"In November 1954 Everglades Fertilizer Co., of Florida, purchased a Kraftpacker Open Mouth Bag Filling Machine from its sales agents, Kraft Bag Corp. Soon thereafter, Inglett & Corley, Inc., of Georgia, manufacturer of the I & C Bagger, for whom the Union Bag-Camp Paper Corp. acts as sales agent, filed suit against Everglades Fertilizer Co. claiming patent infringement. On January 4, 1957, after two years of litigation, Judge Joseph P. Lieb, of the District Court of the United States for the Southern District of Florida, Miami Division, granted a Motion for Summary Judgment to the defendant, holding that there is no genuine issue as to any material fact and declaring plaintiff's patent invalid by virtue of prior public use."

Kraft Bag Corporation, manufacturer of multiwall bags, and sales agents for Kraftpacker Automatic Open Mouth Bag Filling Machine for free-flowing material, announces a new brochure on the newest Kraftpacker model that accommodates weights from 25 to 200 pounds. Complete particulars are included in a new illustrated brochure just released. For copies—address: Kraftpacker, Kraft Bag Corporation, 630 Fifth Avenue, New York 20, N. Y.

NH_3, Looking Up, AAI Board Told

The agricultural ammonia industry appears to be headed into one of its finest years of sales, members of the board of directors of the Agricultural Ammonia Institute were told at their annual Spring meeting at Memphis March 15.

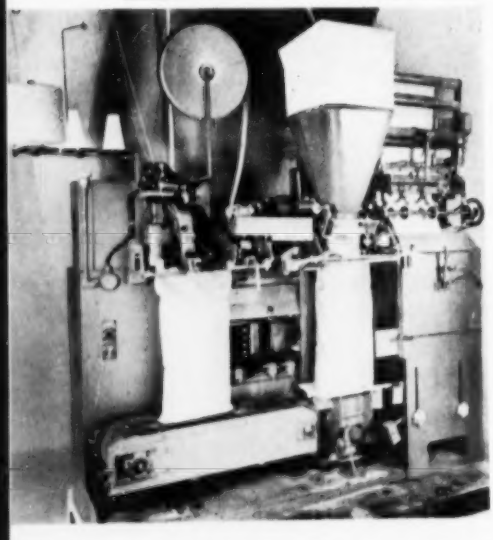
Early reports on 1957 distribution indicated sales were running as high as 30 per cent above the same period a year ago. Optimistic reports involved the sales of anhydrous ammonia for direct application in such states as Texas, California, Louisiana, Mississippi, Arkansas, Missouri, Illinois and Georgia.

In the 1955-56 fertilizer year, the nation's farmers used anhydrous ammonia for direct application for nearly one fifth of their nitrogen fertilizer needs. The 431,000 tons of ammonia applied directly to the soil in that year was an increase of 21.8 per cent over the previous year.

Ammonia distributors are predicting directly-applied ammonia will account for an even greater percentage of the agricultural ammonia used in the 1956-57 fertilizer year.

Approximately 1,500 bulk plant ammonia distributors are now operating in the U. S.

Fully automatic packaging has now been extended to the filling of open mouth multiwall bags with the development by St. Regis Paper Company of its St. Regis VredOMatic packer which makes it possible to fill open mouth multiwalls and sew them closed with or without boundover tape automatically. The VredOMatic packer is used in combination with a St. Regis pre-weighing scale.



"Accurate Placement Of Seed And Fertilizer Key," USDA Says

Placement of fertilizer and forage seeds in separate "bands" within the seedbed may prove to be the farmer's trump card in establishing a good pasture, say forage-crop specialists of the U. S. Department of Agriculture.

Results of experiments conducted since 1952 at the Agricultural Research Center, Beltsville, Md., indicate that the most effective method of forage-plant establishment was a combination of drilling fertilizer 1¼ inches deep and seed ¼ inch deep.

Several advantages of this new concept were revealed in comparative tests between broadcast and band-seeded plots of spring-planted orchardgrass with Sericea lespedeza, and fall-planted tall fescue with Ladino clover.

Increased yields of up to 130 percent at low seeding and fertilization rates was the most spectacular selling point reported, but another recently discovered advantage may be of even more economic importance to the farmer. Latest experiments with Sericea lespedeza and orchardgrass in band-seeded and broadcast plots show that band seeding will give good stands, even when planting is done considerably earlier or later than is usually recommended. By comparison, broadcast plots seeded much earlier or later than usual had a very low survival rate and gave poor yields.

In fall planting of a mixture of tall fescue and Ladino clover, better establishment was noted in three out of four years as a result of drilling fertilizer below drilled seed. Establishment was measured by emergence, development of seedlings, and first-year yields.

In these plantings, poor moisture conditions in most cases reduced stands materially in broadcast treatments three out of the four years (1952-1955). However, excellent moisture conditions prevailed in the fall of 1955, and USDA agronomists noted little difference in emergence, although band-seeded plots still showed more vigorous seedling growth.

The researchers found that in no instance were fall stands of broadcast treatments superior to drilled treatments within the same groups of fertilizer and seed rates.

On spring-planted plots of orchardgrass with Sericea lespedeza, drilling fertilizer below drilled seed has a depressing effect on establishment in two out of three years, except in the case of phosphate fertilizer alone.

Phosphoric acid and complete fertilizer stimulated early growth, but recent results seem to indicate that applications of nitrogen or potash, alone or in combination, are apparently detrimental to germinating seeds and seedlings.

Commercial band-seeding equipment—embodying the principles of machines designed by USDA engineers and agronomists for experimental purposes—may be purchased from several farm implement companies.

Converted grain drills may also be used for band seeding. Three boxes are essential, and a combination fertilizer-grain drill equipped with a legume box makes a good piece of machinery for planting legumes, timothy, and other pasture seeds.

USDA researchers point out that considerable work remains to be done on fertilizer ratio, fertilizer placement, degree of precision necessary, and type of band-seeding machinery that gives best results. Further study is also required to determine the species and practices best adapted to soil and weather conditions of particular areas.

Research is underway to determine the advantages and disadvantages of seeding forage grass and legume plants between the rows of a companion crop, and the fertilizer placement that will give adequate yields if the campanion crop with minimum competition to the forage seedlings.

Research is also being done in cooperation with State experiment stations on various aspects of band seeding and to determine ways of overcoming the crowding-out effect of established plants on areas being renovated.

CLASSIFIED ADVERTISING

For Sale, Exchange and Wanted Advertisements, same type now used, EIGHT CENTS a word for one insertion; TWELVE CENTS a word for two insertions; FIFTEEN CENTS a word for three insertions, and FOUR CENTS a word for each insertion more than three; ADVERTISEMENTS FOR THIS COLUMN MUST BE PAID IN ADVANCE.

WANTED: Supervisor for fertilizer sales and plant operations in New York State. Send full details of experience, qualifications and salary expected. Box #58, c/o Commercial Fertilizer, 75-3rd St., N.W., Atlanta, Ga.

PLANT SUPERINTENDENT wishes to make a change, 19 years experience in 50 thousand ton capacity plant. Married, 3 children, age 39. Write Box #59, c/o Commercial Fertilizer, 75-3rd St., N.W., Atlanta, Ga., for reference and business resume.

POSITION WANTED: Sales Manager, experienced, hiring, training, supervising, salesmen, fertilizer & ingredients. (Wholesale) Box K, Commercial Fertilizer, 75-3rd St., N.W., Atlanta, Ga.

FOR SALE: Rotary Dryers 5' x 30', 5' x 40', 4'6" x 50', 5' x 67', 6' x 60', 9' x 80'. (1) Pressure Tank 13,000 gal. 220#. Also Mixers, Storage Tanks, Screens, Elevators. Send us your inquiries. Brill Equipment Company, 2402 Third Ave., New York 51, N. Y.

FOR SALE: (70) Welded steel storage tanks from 4,300 to 25,000 gal. sizes. (13) Aluminum Storage Tanks 3,000-23,000 gal. Rotary dryers, 3'6" x 25', 4'6" x 32', 4'6" x 40', 104" x 70'. Also Mixers, Blenders, Hammermills, Pulverizers, Bucket Elevators, Conveyors, etc. Perry Equipment Corp., 1426 N. 6th St., Philadelphia 22, Pa.

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